THE AMERICAN
JOURNAL OF PSYCHOLOGY

Founded by G. STANLEY HALL in 1887.

VOL. XV. APRIL, 1904. No. 2.

THE SOUL—A STUDY OF PAST AND PRESENT BELIEFS.

By L. D. ARNETT.

INTRODUCTION.

The selection of this subject[1] for investigation was not made with the view of settling any of the disputed points as to the nature of the soul, or even of raising the question as to whether man is endowed with a soul, but rather because the writer felt a lack of knowledge of the subject and has taken for granted that other students have the same feeling. As progress is made in any line of industry it is well to "take account of stock" at times and if the "assets" are sufficient the books may be closed, new accounts opened, and the stock increased. The results of this study may not justify the "closing of the books" but they may represent something of the "stock on hand." Students of psychology feel the lack of any definite understanding of the term "soul" as used by psychologists, compared with the meaning attached to it by the ministry. One object of the study is to present the views of these two professions. Another object is that, from the material presented, some definite understanding of the use of the term may at least be suggested. The subject is treated from the historical standpoint. The first section presents the ideas of primitive peoples. For the section on present ideas of the soul, the material of which was collected by means of a questionnaire, the writer desires to take this occa-

[1] The writer desires to express his thanks to Dr. E. F. Buchner, of the University of Alabama, for suggesting the subject, and for valuable advice as to the method of arranging the material; to Dr. G. Stanley Hall and other members of Clark University for valuable suggestions.

sion to thank those who assisted him in collecting the data. The reader may be disappointed when he discovers that no very definite conclusions are reached. But it is hoped that the material will at least prove suggestive for future studies in psychology.

Primitive Ideas of the Soul.

A study of the beginning or origin of any mental trait or even of a social institution must deal more or less with the indefinite. Studies of existing savage and half-civilized races furnish certain data; to lower levels, or earlier stages of mankind we cannot go, and any reference to such state or condition is merely conjecture. The data presented in this study has been gathered from reports,[1] for the most part trustworthy. Yet we cannot vouch for the explanation given in all cases. To get at the real meaning of savage life, and to be able to properly interpret the beliefs of the savage, would imply in many cases long residence among these people. Perhaps too often, during the past, a hasty explanation has been given of what was thought to be understood. The savage does not clearly understand the reasons and causes for his own beliefs, his language is inadequate to give an accurate explanation. Educated people find it difficult to tell what they mean by soul; the savage no doubt experiences greater difficulty. He may not be able to think in abstract terms, or to conceive of an abstraction separate from an object. The psychology of the savage mind has not been sufficiently studied. He has no need for the shades of meaning expressed by various words in modern psychology. While the data given may not all be correct—much of it is, and as such is valuable as a basis for our study.

The first point that demands our attention is the state of mind of the savage. What conditions have given rise to any idea of the soul? Again, what are some of the explanations that have been offered to account for any idea of a soul, or how has the idea arisen?

As to the state of mind of the savage Lang offers the following:

---

[1] The principal data on the beliefs of primitive people are found in the following named works:

Primitive Culture, Tylor; Golden Bough, Fraser; Psychologie der Naturvölker, Robinsohn; International Archiv für Ethnologie, Vol. XIII, 1900; Journal of American Folklore; Myths of the New World, Brinton; Native Races, Bancroft; Teutonic Myths, Grimm, Vol. IV; Popular Science Monthly, Vol. XXXIV; Sociology, Vol. I, Spencer; Descriptive Sociology, 8 parts, Spencer: Zeitschrift für Ethnologie, L'Anthropologie; Psyche, Rhode American Anthropologist, International Archiv für Ethnographie, Supplement 1900, Bureau of Ethnology.

"We[1] set out to discover a stage of human intellectual development which would necessarily produce the essential elements of myth. We think we have found that stage in the condition of savagery. . . . . .

"For the purposes of this inquiry, it is enough to select a few peculiarities of savage thought.

1. "First we have that nebulous and confused frame of mind to which all things, animate or inanimate, human, animal, vegetable, or inorganic, seem on the same level of life, passion or reason. The savage draws no hard and fast line between himself and the things in the world. . . . . .

2. "The second point to note in savage opinion is the belief in magic and sorcery. The world and all the things in it, being vaguely conceived of as sensible and rational, obey the commands of certain members of the tribe, chiefs, jugglers, conjurors, or what you will. . . . . .

3. "Another peculiarity of savage belief naturally connects itself with that which has just been described. The savage has very strong ideas about the persistent existence of the souls of the dead. They retain much of their own nature, but are often more malignant after death than they had been during life. They are frequently at the beck and call of the conjuror, whom they aid with their advice and with their magical power. By virtue of the close connection already spoken of between man and the animals, the souls of the dead are not rarely supposed to migrate into the bodies of the beasts, or to revert to the condition of that species of creatures with which each tribe supposes itself to be related by ties of kinship. With the usual inconsistency of mythical belief, the souls of the dead are spoken of, at other times, as if they inhabited a spiritual world, usually a gloomy place, which mortal man may visit, but whence no one can escape who has tasted of the food of ghosts.

4. "In connection with spirits a far-reaching savage philosophy prevails. It is not unusual to assign a ghost to all objects, animate or inanimate, and the spirit or strength of a man is frequently regarded as something separable, or something with a definite locality in the body. A man's strength and spirit may reside in his kidney fat, in his heart, in a lock of his hair, or may even be stored by him in some receptacle. Very frequently a man is held capable of detaching his soul from his body, and letting it roam about on business, sometimes in the form of a bird or other animal.

5 6. ". . . . The savage, like the civilized man, is curious. The first faint impulses of the scientific impulses are at work in his brain; he is anxious to give himself an account of the

[1] A. Lang: Mythology, Ritual and Religion, Vol. I, pp. 48-51.

world in which he finds himself. But he is not more curious than he is, on occasion, credulous. His intellect is eager to ask questions, as is the habit of children, but his intellect is also lazy, and he is content with the first answer that comes to hand."

These are some of the conditions with which the intellect of the savage deals. He no doubt seeks the easiest means of explanation, and is satisfied for the time being.

Fraser[1] offers the following explanation:

"As the savage explains the processes of inanimate nature by supposing that they are produced by living beings working in or behind the phenomena, so he explains the phenomena of life itself. If an animal lives and moves it can only be, he thinks, because there is a little animal inside which moves it. If a man lives and moves, it can only be because he has a little man inside who moves him. The animal inside the animal, the man inside the man, is the soul." The activity of a man or animal is explained by the presence of the soul, sleep or death by its absence. Sleep and trance is the temporary, death the permanent absence of the soul.

Tylor[2] says the personal soul or spirit among lower races may be defined as follows: "It is a thin, unsubstantial human image, in its nature a sort of vapor, film or shadow; the cause of life and thought in the individual it animates; independently possessing the personal consciousness and volition of its corporeal owner, past or present; capable of leaving the body far behind, to flash swiftly from place to place, mostly impalpable and invisible, yet also manifesting physical power, and especially appearing to men waking or asleep as a phantasm separate from the body of which it bears the likeness; continuing to exist and appear to men after the death of that body; able to enter into, possess, and act in the bodies of other men, of animals, and even of things." This definition has wide application, is, in fact, a general definition, yet as one having universal significance it was not so claimed by the author.

This conception of the soul "preceded and led up to the more transcendental theory of the immaterial and immortal soul, which forms part of the theology of higher nations."[3]

Bancroft[4] speaking of the native races of America says: "The most general idea of a soul seems to have been that of a double self, possessing all the essence and attributes of the individual, except the carnal embodiment, and independent of the body in so far as it was able to leave it and revel in other

[1] Fraser: The Golden Bough, Vol. I, p. 121.
[2] Tylor: Primitive Culture, Vol. I, p. 429.
[3] Tylor: *op. cit.*, Vol. II, p. 24.
[4] Bancroft: Native Races, Vol. III, p. 514.

scenes or spheres. It would accordingly appear to another person, by day or night, as a phantom, with recognizable form and features, and leave the impression of its visit in ideas, remembrances, or dreams."

But how dim or obscure this idea may be. Let us take for example the belief of the Ashantis. According to Müller[1] this tribe has a word *kla*, which means the life of man. If used as a masculine, it stands for the voice that tempts man to evil. If used in the feminine, it is the voice that persuades us to keep aloof from evil. Lastly, *kla* is a tutelary genius of a person who can be brought near by witchcraft, and expects sacrifices for the protection which he grants. When a man dies, his *kla* becomes *sisa*, and a *sisa* may be born again."

Or if we take another example, what do the Indians believe with regard to the soul?

An account of the Omaha Indian belief is given by Mr. La Flesche. He says there are a variety of beliefs concerning the immediate action of the spirit upon its withdrawal from the body. "Some think that the soul at once starts upon its journey to the spiritland; others, that it hovers about the grave as if reluctant to depart. Because of this latter belief, food and water are placed at the head of the grave for several days after the burial. The spirit is supposed to partake of this food. No Indian would touch any article of food thus exposed; if he did the ghost would snatch away the food and paralyze the mouth of the thief, and twist his face out of shape for the rest of his life; or else, he would be pursued by the ghost, and food would lose its taste, and hunger ever after haunt the offender."[2]

The concept of immateriality, lacking content is as incomprehensible for the savage, says Schultz,[3] as for the subtle metaphysician, who forms the immaterial concept but cannot demonstrate it. Because the human soul or spirit, as a picture, is not bound up in space and time. At death, it leaves the body quickly and is not seen; in the dream it is supposed to travel great distances with very great rapidity. These ideas early led to the conception, thinks Robinsohn, that the soul was fleeting, light, and movable in its nature, and that it had the form of an animal.

In the separate treatment of ghosts and spirits, especially in their connection with primitive man's ideas of the soul, no sharp lines can be drawn. It is, as Hartland says,—speaking of the lower stages of civilization, "No distinction is drawn between supernatural and spiritual beings who have never

[1] Max Müller: Origin of Religion, p. 112.
[2] La Flesche: Journal of Folklore, Vol. for 1889, p. 11.
[3] Kosmos, III. Jahrg., 6 Bd. S. 327 (Robinsohn, *loc. cit.*, p. 37 quoted), *ibid.* p. 37.

been enclosed in human bodies, and the spirits of the dead. Savage philosophy mingles them together in one phantasmagoria of grotesquery and horror. The line which separates fairies and ogres from the souls of men has gradually grown up through ages of Christian teaching; and broad as it may seem to us, it is occasionally hardly visible in these stories."[1]

Robinsohn in his Psychologie der Naturvölker,[2] thinks that the sight of the dead has influenced savage belief.

As the naïve savage mind viewed his dead relative, who a short time before spoke and moved freely, he must, involuntarily, have come to the conclusion that something had left the body; and that something we call the soul. Thus the significance of death was explained and the soul discovered. But in arriving at the idea of soul, first he considered the dream as a real occurrence, and then from the facts of the dream, he concluded that he is a double being, a synthesis of body and that part of him that made journeys and gained new experiences while he slept. The soul is[3] assumed, among many peoples, to have animal form. This notion has probably grown out of the fact that during the dream period the soul is supposed to travel over great distances in a moment's time. The savage hunter knows that many animals and especially birds have this swiftness of movement, so by analogy he concludes that the soul must have a like means of travel. Of the different forms which are sometimes ascribed to the soul, the human form is the one most often given. The savage is led to this conclusion, Robinsohn thinks, partly by the effect of the dream, but more impressively by the shadow itself. Why he fixes upon the shadow is because it has the contour of the body, is intangible, and disappears on the approach of darkness. The fact that there are some peoples, as the Abipone Indians for instance, who do not comprehend the meaning of death,—that is, that it is the end of corporeal existence—but do know of dreams, has led Mr. Robinsohn to lay great stress on the dream as being the true inlet of the belief in a soul. Bordeaux[4] bases very much on the dream. He points out the influence of the dream on our philosophical system, contending that metaphysics and the entire transcendental world has been built up on the basis of the belief in dreams. The resemblance of death to sleep, not easily distinguishable even by civilized peoples at times; the dream as a reality, a part of the body independent at times; these form a substantial basis of belief in an unseen image of the individual, or soul, for the savage. They form a basis for

[1] Hartland: The Science of Fairy Tales, p. 43.
[2] Psychologie der Naturvölker, p. 2.
[3] *Ibid.*, p. 7.
[4] Problème de la Mort.

another world, that of spirit and thought, which civilized man has tried so often to describe and explain.

Spencer[1] thinks that "dream-experiences necessarily precede the conception of a mental self; and are the experiences out of which the conception of a mental self eventually grows."

These ideas, as expressed by different students of the subject, while they are not stated as scientific facts, are merely satisfactory or plausible explanations.

The dream is the most influential factor, because the experiences of dream life seem real, and to the savage may seem an actual experience. Then the shadow had contributed an idea of form, the breath some idea of color or tangibility. But underlying all these—the one mystery that has given vitality and served to perpetuate these ideas is that of death.

THE WORD "SOUL."

Let us turn to the word "soul" and study its meaning as expressed by various peoples. An analogous comparison is usually made of what the savage regards as the soul with the function of some organ of the body. The shade of meaning expressed depends on the organ or function with which it is compared.

The data, however, is valuable in getting at the actual facts of belief.

Some words used for "soul" by various tribes, and their synonymous meanings are as follows:

Iroquois. Eri or eriasă, or aweriasă—the soul; the heart; and the mind, considered as the seat of sentiment.
Mohawk. Atouritz—Soul; atourion—to breathe (derived from same root).
Algonquin. Tchuk, or Otachuk—Soul, shadow.
Abipones. Loàkal—Shadow, soul, echo, picture.
Aztec. Ehekatl—wind, shadow, soul.
Zulu (Negro). Isi-tunzi—soul, shadow.
Bechuana (Negro). Isi-tunzi—soul, shadow.
Papuan. Geist (not aboriginal with them)—soul, steam, fog.
West Australian. Wang—breath, spirit, soul.
Negroes of West Coast Africa. The soul usually called "kra," is a guardian spirit that lives in the man. The immortal part is the man himself in a shadowy or ghostly form, called *srahman* (Sunsum—Spirit and shadow).
Java. Ñava—breath, life, soul.
Tasmanian. Warrawah—shade, shadow, ghost or apparition.
Karens. Lá—soul, ghost or genius.
Carib. Iouanni—soul, life, heart.
Old Calabar. Ukpon—soul, shadow.
Basutos (Negro). Seriti—shadow, or spirit remaining after death.
Arawak (Indians). Ueja—shadow, soul, or image.
Quiché (Indians). Natub—shadow, soul.
Netela (Language of Cal.) Piuts—life, breath, soul.

[1] Sociology, Vol. I, p. 157.

Basque. Arima—Soul, astoarin arima—butterfly.
Eskimo. Silla—air, wind, world, mind.
Gypsies. Dûk—breath, spirit, ghost.
Arabic. Ruh—breath, spirit.
Sanscrit. Atman—Soul, spirit, breath, sun, fire.
Gothic. Saivala—Soul, the word related to *saivs* which means the sea, from the root *si* or *siv*—to shake. The soul is conceived by the Teutons as a sea within, heaving up and down.
Hebrew. Nephesh—breath, life, soul, mind, animal; Ruach and Neshamah—breath, spirit.
Greek. Thymos—soul, from *thyein*—to rush, or move violently.
Romans. Latin (Cicero). Animus—mind, from *anima*—air, soul. (From the latter word we have animal.) *Anima* comes from root *an*—to blow. In Sanscrit, anila—wind; in Greek, anemos—wind.

EUROPEAN WORDS FOR SOUL.

Old High German—Sêola.	Slavonian—Duzha.
Middle High German—Sêle.	Bohemian—Duse.
New High German—Seele.	Polish—Dusza.
Anglo-Saxon—Sáwl.	Lithuanian—Duszia.
Old Norse—Sâl	Litt—Dwehsele.
	(Psuche).
Swedish—Själ.	Greek—(ψυχή)
Danish—Själ.	Latin—Anima.
Finn—Sielu.	Italian—Anima.
Russian—Dusha.	French—âme.
Servian—Dusha.	Old French—arme.

Spanish—Alma.

These words are all feminine gender, and, as Grimm[1] points out, distinguish this conception of the soul from the masculine breath and spirit.

In the German language we have the terms "geist" and "seele" for which the following explanation has been given.[2]

The words "*geist*" and "*seele*" (spirit and soul) are among those; the derivation of which is not yet satisfactorily ascertained.

"In the word '*geist*,' it does not assist us much to refer to the older forms accessible to us. The Gothic does not possess the word, at least so far as our sources reach; rather the Gothic translates the Greek '*pneuma*' by '*ahma*.' The Anglo-Saxon has the word in the form of 'gast;' in the old Saxon it appears as 'gest;' and even in the old High German it reaches far back in the forms '*geist*' and '*keist*.' On the other hand, again, it is wanting in the old northern, which reproduces the idea of 'pneuma,' '*spiritus*, in the word 'andi' (masc). But even this '*andi*' does not occur in the rythmical Edda, and seems generally only to be used in prose, and in such poems as bear a distinctly Christian character. All the forms in

[1] Teutonic Myth, Vol. II, p. 826.
[2] R. von Raumer, on *Geist* and *Seele*, "referred to the fundamental idea of their Germanic appellations," in Delitzsch, "System of Biblical Psychology," trans. 1890, Edinburgh.

which the older Germanic languages present the word '*geist*,' testify (1) that the initial sound is a mute in the Gothic degree of sound '*g*;' (2) that the vowel of the word (High German '*ei*,' Anglo-Saxon '*a*,' old Saxon '*e*') correspond to the Gothic '*ai*.' Hence it follows that the derivation of the word 'Geist' from the old High German '*jesan*' (*fermentescere*, to ferment) is untenable. Grimm (*Gramm.* ii. 46) traces '*geist*' back to the root '*geisan*,' '*gais*,' '*gisun*' (*ferire*), but this root itself is only assumed to exist. There remains, therefore, nothing to do but to bring together the words of the Germanic languages whose sound accords with '*geist*,' and whose import points to a connection with this word. In a peculiar manner the two old Germanic languages from which the word '*geist*' proceeds, actually present some words which probably lead us to the fundamental idea of the word. The old-northern has a trace of a word '*geisa*'—*cum impetu ferri, cito cursu ferri, ruere.* But the Gothic renders ἐξίστάναι Mark iii, 21 by *usgaijan;* Luke ii, 47, and elsewhere ἐξιστάσθαι by '*usgaisnan*.' We should thus be led to suppose that the idea lying at the root of the word '*geist*' is that of quick, hasty movement. The old-northern substantive *ôdr* (Völuspa 18), spirit, offers an analogy with this ideal affinity in its reference to the adjective *ôdr*, rash, impetuous, fierce, and to its root, *vada prael: od*, to go along eagerly, with force.

"The word '*seele*' (soul), Gothic '*saivala*,' seems to be connected with the Gothic '*saivs*' (late High German, '*See*'); and the connecting idea appears, in like manner, to be that of movement, although of a gentler kind. The word '*seele*' occurs in the Gothic ('*saivala*') old High German ('*sêla*'). Anglo-Saxon ('*sâvul*'), '*sâvl*,' '*saul*'), old Saxon ('*sêola*,' '*siola*'). On the other hand, the word does not seem to have appeared in the old-northern until the period of Christianity. In the whole rhythmic Edda, only the distinctly Christian '*Solarliod*' contain it. We have the original psychological mode of expression of the north German in '*Völuspa*' 18, where *ôdr* is interchangeable with '*geist*,' and *ond* with *seele*, without, however, implying that by these ideas are hidden there in all their meaning and extent. At all events, it looks as if Christianity had been the first means of representing the *ôdr* of the Edda as '*andi*,' the '*önd*' of the Edda as '*sâl*.' The Icelandic translation of the New Testament (Kaupmannahaufn, 1807) renders 'pneuma, by '*ande*,' psuché' by '*sal*.' There needs still further investigation to tell us how far, in the other Germanic languages also, the promulgation of the words '*geist*' and '*sêle*' might be associated with the introduction of Christianity."

The Influence of Dreams.

Some writers, as above noted, think that the dream alone has given rise to our idea of the soul. Civilized man has passed far beyond this state of mind. The educated person rarely connects the dream with his idea of soul, or is it associated with his religion. But how is it with the child? And what has it meant for the savage?

Spencer[1] notes that "hunger and repletion, both very common with the primitive man, excite dreams of great vividness. Now, after a bootless chase and a long fast, he lies exhausted; and, while slumbering, goes through a successful hunt,—kills, skins and cooks his prey; and suddenly wakens when about to take the first morsel. To suppose him saying to himself, 'It was a dream,' is to suppose him already in possession of that hypothesis which we see he cannot have. He takes the facts as they occur." That is, as he further states, another part, his other self has experienced these things, while his body has remained at rest. This is without doubt a correct interpretation, and such an experience would greatly influence the savage.

"He knows nothing[2] of sensations and ideas—has no words for them. Still less has he any such highly abstract word or conception as consciousness. He does not think about thought; neither do his faculties suffice for this. During early stages he merely thinks without observing what he thinks; and therefore never asks how he thinks, and what it is which thinks. His senses make him conversant only with things externally existing, and with his own body." Mr. Spencer thinks that the savage thus takes the dream psychoses as they occur, as facts, and for no other reason than that he lives and acts in the external world, that of sensation, and has no concept of mind or dream. He cites examples of the poverty of aboriginal languages as a further proof that psychoses are all alike considered real. Since the savage considers the dream as an actual experience, then the idea of a dual existence, *i. e.*, of being in two places at the same time is inevitable.

The Indians of South America in order to produce the state of the dream, which is considered by them a reality and during which many wonderful achievements are executed, use poison as a narcotic. Among the Schingu Indians as Schmeltz[3] relates, the medicine-men kill themselves with the poisonous drug in order, as they think, to change the human form into

---

[1] Spencer: Prin. of Sociology, p. 148.
[2] Spencer: Sociology, Vol. I, p. 146.
[3] International Archiv für Ethnologie, Vol. XIII. Beliefs of the South Amer. Indians.

that of the shadow or soul without the body. This use of the narcotic is one of the devices which the medicine-man employs against the superstitions of his tribe. Death itself, says Schmeltz,[1] is regarded as a narcotic effect of some kind in the body, causing the shadow to be separated from it, never to return to awaken the sleeper.

The idea of the soul as related especially to the dream among different tribes is as follows:

Schingu Ind. (S. Amer.). They believe that experience in dreams is reality, and that while the body is in the hammock they are still able during the dream to hunt, fish and fell trees.

Iroquois. The rational soul was believed to visit the objects thought of in the dream, while the bodily soul remained.

Negroes of West Coast Africa. Dreams are regarded as the adventures of the "Kra." Sickness occurs only during its absence.

Bakairì (S. Amer.). The shadow is believed to wander about during sleep. It is dangerous to waken a person during its absence and its search to return to the body causes headache at night.

Paressi (S. Amer.). Have an idea regarding the soul similar to the above mentioned belief. The soul, or shadow, is called "Niako." It leaves the body at the neck and a ringing in the ears denotes its return.

Bororó (S. Amer.). Believe the dream to be a reality and try to induce it as a means of communication. The soul, "bupe," leaves the body of the sleeper in the form of a bird. It experiences many things on its journey and what it relates is regarded as the absolute basis of truth.

Karaya (S. Amer.). The spirit is thought to leave the sleeping body in order to ramble about and hold intercourse with other persons or spirits.

New Zealander. During sleep the mind or soul is believed to leave the body to hold converse with friends. The facts and adventures of dream are the objects seen during its wanderings.

Tagals (Luzon). The soul leaves the body during sleep. It is considered dangerous to waken a person during its absence.

Greenlander. Certain of these people believe that the soul quits the body during sleep, and goes hunting, visiting, etc.

Fiji. The spirit of a living man is said to leave the body in order to trouble other persons when asleep.

Dyaks (Borneo). The dream represents the actual experiences of the soul which is supposed to go on expeditions of its own during sleep. It is said to see, hear, and talk in its meanderings.

Karens (India). During sleep the lá, or spirit, is believed to wander to the ends of the earth; our dreams consist of the things the soul, or lá, sees and experiences on its journey.

Peruvian. Believe that the soul leaves the body while it is sleeping, and what we dream are things seen in its wanderings. The soul cannot sleep.

Japanese.[1] If a sleeper is awakened suddenly and violently, he is sure to die, because his soul is rambling. The soul is supposed to have form and color, and to be a small, round, black body. Its adventures furnish material for imaginative literature.

Chinese.[2] The soul is thought to travel during sleep. The spiritual

[1] Int. Arch. für Eth. Vol. XIII. Beliefs of the South Amer. Ind., p. 5, *ibid.* 6.

[1] and [2] Oakes: Popular Science Monthly, Vol. XXXIV.

man, or soul, of Tih Kwalee, one of the gentry, was on a voyage, so the story goes, and a wild beast ate the body during its absence. On its return the spirit, finding only the skeleton of the man, entered the corpse of a black lame beggar near by and always afterwards walked with a staff.

Burmese. It is believed that the Leip-bya (butterfly spirit), wanders during sleep. Its encounters are considered to be the explanation of dreams. Sickness is thought to be due to some misfortune befalling it on one of these excursions.

Celts. The old belief is that the soul wanders from the body at times. It is related of two young men that while sitting on the bank of a cascade, one of them fell asleep; the other, seeing issue from his mouth an indistinct form no larger than a humble-bee, tried to waken him, but before he succeeded the cloud-like creature returned, and the young man awoke and related a wonderful dream.

Buriat. The soul is believed to quit the body during sleep. It visits the spirits and remembers its experiences.

Vedanta (philosophy). In deep sleep the soul separates itself from the body and remains with God or the world-soul during the slumber.

A different idea, emphasizing another side of dream life, is brought out by the savage when he proclaims that he has been visited during the dream by some one in spirit. In addition to the idea that the soul departs during sleep the Indians held this conception of the dream. They believed that the personages met in the dream were real and must be obeyed.

Sandwich Islanders. Departed members of the family sometimes appear in a dream to the survivors, and watch over their resting.

Malagasy. The good demon comes to tell them in their dreams when they ought to do a thing, and to warn them of some dream.

Africa, Congo People. Think that the things they see and hear in dreams come to them from spirits.

Wanika (E. Africa). Believe that the spirits of the dead appear to the living in dreams.

Kaffirs. Ascribe dreams in general to spirits.

Zulu. Two views are held: (1) The individual may be visited in a dream by the shade of an ancestor, the itongo, to warn him of danger; (2) he may be taken by the itongo to visit distant scenes.

Indians. Two ideas prevail: (1) Either a soul from without visits the sleeper; (2) or, the rational soul goes on an excursion during sleep, while the sensitive soul remains with the body.

Fijian. The spirit of another person is believed to come to visit him during sleep.

Indian of Brit. Columbia. Believes that the spirit of another comes to visit him in a dream.

Negroes of South Guinea. Dreams are thought to be the visits of the spirits of deceased friends.

Ancient Greeks. Believed that the dream-soul is a visitor from the dead. Achilles was visited by the soul of Patroclus. Homer LXXIII, 59.

Romans (Cicero). Dreams are both phantoms of the living and ghosts of the dead. De Divinatione I, 27.

The Soul as an Animate Form.

The most common attribute of the soul, if we may so speak of it, is that of animate form; the soul being represented as some animal. As will be seen in the list of animals noted be-

low, the serpent and bird are frequently used, and again the butterfly. In regard to the bird, Brinton[1] suggests that "it has the incomprehensible power of flight; it floats in the atmosphere, it rides on the winds, it soars toward heaven where dwell the gods; its plumage is stained with the hues of the rainbow and the sunset; its song was man's first hint of music; it spurns the clods that impede his footsteps, and flies proudly over the mountains and moors where he toils wearily along. He sees no more enviable creature; he conceives the gods and angels must also have wings; and pleases himself with the fancy that he, too, some day will shake off this coil of clay, and rise on pinions to the heavenly mansions. All living beings, say the Eskimos, have the faculty of soul, but especially the birds."

Since to the Indian, says Schmeltz,[2] incorporeality of soul is not to be comprehended, and because the spirit of the dead appears in human form, that is, as shadow, he always identifies body and spirit and ascribes to spirits or ghosts of deceased persons the same activities, needs and cares that belong to the living.

Birds.

Because of some fanciful resemblances, perhaps, as suggested by Brinton, many tribes have associated the soul with birds.

Icannas (Ind. S. A.). The souls of the brave were believed to travel in beautiful birds and to eat luscious fruit, while those of cowards became reptiles.

Kailta (Ind. Cal.). When a person dies a little bird is thought to fly away with his soul to the spirit-land. If he was a bad Indian, a hawk catches the little bird and devours it, feathers and soul.

Bororó (S. A. Ind.). During a dream the soul is thought to travel in the shape of some bird, and at death to be changed into a red Arara.

Makusi (S. A. Ind.). The cry of a nocturnal bird, the goat-sucker, is believed to be that of a spirit in the form of a bird.

Powhatan (Ind.). A certain little woodbird was supposed to be the soul of the dead chieftains of this tribe. Great care was taken not to harm this bird.

Hurons (Ind.). After the burial of the bones at the feast of the dead, the soul is thought to pass into the form of a turtle-dove. This is also the belief of the Iroquois Indians.

Caribs (Ind.). The bat is thought to be a departed spirit.

Algonquin (Ind.). There is thought to be two souls; the animate soul, which departs from the corpse in the shape of a dove, and the physical, which enters into another human being.

Finns. The Milky Way was called the Birds' Way, or the way of souls. The Lithuanians, and nearly all Indo-European peoples, had similar sayings.

---

[1] Myths of the New World, p. 123.

[2] Beliefs of the South Amer. Indians. Inter. Arch. für Eth., Vol. XIII, p. 10.

Bohemians. The heathen Bohemians thought that the souls of the dying flew out of their mouths in the shape of birds.

Celebes. The soul is conceived of as having the form of some bird. It is thought that the bridegroom's soul is liable to fly away at marriage, so colored rice is scattered over him to induce it to stay.

Servians. The soul is represented as an aerial or bird-shaped substance, which escapes from the body at death and, like a timid bird, flits from tree to tree until the burial. It is often transformed into a cuckoo.

China. After twenty-one days of mourning for the dead, paper storks are placed on poles in front of the house that they may carry the soul of the departed one to paradise.

Egyptians. One part of the soul, the "ba," was represented as a bird with human head and hands.

Moslems. The souls of the faithful are believed to assume the form of snow-white birds and to nestle under the throne of Allah between death and the resurrection.

Saxons. Many Saxons represent the soul as a dove which ascends to heaven, or as a humming-bird which goes to heaven after twenty-four hours.

Romans. The myth of Aristeas, as related by Pliny,[1] represents the soul of the dying man as issuing from his mouth in the form of a raven.

Latin. When a ship founders, those on shore are said to observe the souls of the drowned to fly upward as white doves.

[2]It is a graceful fancy which makes the departing soul either break into a blossom as a flower, or fly upward as a bird.

After Sankara[3] had destroyed the Buddhists in India to prove his supernatural powers to the Grand Lama, he soared into the air, but the Grand Lama perceiving his shadow, as he mounted up, struck his knife into it and down fell the Sankara and broke his neck.

Schmeltz[4] thinks that in accounting for the fact that the soul is supposed to take the form of a bird, or to pass into one, there is to be considered, besides the idea of rapid flight, the lamenting cries of some birds in the night time. These strike terror to the savage and lead him to imagine an imprisoned soul that longs to be back with its friends.

Butterfly.

Nicaraguan (Ind.). The soul of the man, called "Yulio," is believed to separate itself at death and become a wavy, flying substance. It issues from the mouth and looks somewhat like the person.

Karens. The soul is conceived of in the form of a butterfly.

Servians. [5]Believe that the soul of a sleeping witch often leaves her body in the form of a butterfly. If, while it is absent, her body is turned around and her feet placed where her head was before, the soul will not find its way back into the body and the woman will die.

---

[1]Pliny: Nat. Hist., VII, Sec. 174.

[2]Grimm: Teutonic Myth., Vol. II, p. 826.

[3]Frazer: *op. cit.*, Vol. I, p. 142.

[4]Beliefs of the South Amer. Ind., Inter. Archiv für Ethnog., Vol. XIII, p. 14.

[5]Frazer: I, 127.

Burmese. The immortal soul is called Leip-bya, meaning butterfly or spirit.

[1]Among the Burmese, when the mother dies leaving a young baby, it is thought that the "buttterfly," or soul of the baby follows that of the mother and if it is not recovered, the child will die. A wise woman is called to bring back the child's soul. She allures it back by means of a mirror held near the corpse. On the mirror is placed a piece of feathery cotton-down. She then entreats the mother not to take the soul of the child with her, meanwhile catching up the down with a cloth and placing it on the baby's breast.

Irish. The uneducated peasantry regard the pure white butterfly to be the soul of the sinless and forgiven dead on the way to paradise; the spotted ones, condemned souls on the way to purgatory, the spots corresponding to the number of sins.

Italy. A butterfly flitting around a baby's cradle is believed to be either an angel's or a baby's soul.

Russians. When the soul escapes from the body, according to folk-tales, it is sometimes represented as a little bird, or butterfly, and sometimes as a minature human form.

Christianity. Angels are represented as having wings. Psyche is shown as a butterfly on the open hand, or at least, with wings.

Mouse, etc.

Mohaves (Ind.). The soul is believed to rise as the smoke of the funeral pyre curls upward. If the soul is impure from crime or stained with human blood, it is transformed into a rat and must remain four days in a rat-hole to be purified.

Swabian belief. A story relates that a girl's soul creeps out of her mouth in the form of a white mouse.

German (legends and myths). The mouse is symbolic of the soul. A little red mouse is sometimes said to issue from the mouth of the sleeper as the departing soul or spirit.

Russians. The peasants often speak of the Milky Way as the Mouse-path, the mouse being a well-known figure of the soul.

The prevalence of the belief, so common in Eropean folk-lore, that the mouse represents the soul, has led Mr. Conway[2] to formulate the theory that the shudder which some nervous people feel at the sight of even a harmless mouse, is a survival of the time when it was believed that in this form unshriven souls, or those of unbaptized children, haunted their former homes.

Serpent.

Kaffir. When a Kaffir sees a serpent in his dwelling, he thinks that the soul of some dead person has returned for revenge.

Zulus. The incarnated spirit is called "Ihlozi." If a serpent is seen on the grave, the Ihlozi is believed to have taken up its abode.

Arabs. The serpent is believed to be no ordinary creature, but a "deschim," a spirit. Mohammed recognized good and evil spirits in the serpent.

German (Myth.). The soul was seen to come from the mouth of King Gunthrum in the form of a little serpent.

---

[1]Frazer: I, p. 130.

[2]Demonology and Devil Lore, Vol. I, p. 128.

Lizards.

The Santals[1] believe the soul to have the form of a lizard, and relate how on one occasion it left the body, while the owner was asleep, and entered a pitcher of water to drink. Just then the owner of the pitcher covered it, the soul did not return to the body and the man died. But while they were preparing to burn the body, some one uncovered the pitcher—the soul escaped, returned to the body and the man revived.

Among the Netherlandish peoples, in the stories of King Gunthrum, the soul is depicted as issuing from his mouth in the form of a small reptile.

Fish and other Animals.

Kaffirs. Fish are not eaten because they are believed to embody souls.

East Brazil (Ind.). The soul is thought to pass into the fish that are placed on the grave and it is in this way protected.

Nias. The heart soul (Noso dodo) is believed to survive after death in the form of a spider.

Kainguá (Ind. S. A.). It was thought that a tiger which roamed about in the vicinity of a burial ground was the changed form of a recently buried person.

Buriat. The soul is believed to take the form of a bee.

Goyatacas (Brazil Ind.). This tribe believes in the immortality of the soul. The soul is thought to wander for a time in the body of a cow.

In Transylvania[2] it was reported at the trial of a witch, that the woman, together with two men who were employed by her in a vineyard, lay down at noon to rest. She failed to awake at once. A large fly was seen buzzing around. This was caught by one of the men and put into his leather bag. For some time they were unable to waken the woman. Later, however, the fly being released flew directly into her mouth and she awoke. They then knew that she was a witch.

Frazer[3] relates the incident of a Melanesian woman who, knowing that a neighbor was at the point of death, heard a rustling in her house as of a moth fluttering. The lamentation told her at the same instant that the soul had flown. She caught the fluttering thing, ran with it and held it above the open mouth of the corpse; but it failed to revive.

The natives of the Danger Islands[4] of the South Pacific believe in different sizes of the soul. The sorcerers set snares of different sizes of stout sennit, fifteen to thirty feet long, with loops on either side to suit the size of the different souls. For fat souls there are large loops, for thin souls small ones. This

[1] Frazer: I, 126.
[2] Frazer: Vol. I, p. 126.
[3] The Golden Bough, Vol. I, p. 136.
[4] Gill: Myths and Songs of the South Pacific, p. 171

method was employed by the sorcerers against persons towards whom they bore ill-will, and accordingly when a man was sick these soul-snares were set up in the trees near his house. The soul might be caught in the shape of a bird or insect, and if so, the man infallibly died.

These various associations of the soul with different forms of animal life, as expressed above, from one standpoint suggest something of the pathetic. Realizing that, physically, they cannot accomplish, or reach a certain ideal they have in mind, the savage imagines, with child-like simplicity, that the fulfillment of these ideals will be attained by means of increased powers. He could satisfy many of his longings if he were only able to accomplish certain things that animals can do so easily.

THE SHADOW.

What has been the influence of the shadow on the minds of primitive peoples? Has it contributed to the idea of the soul? We cannot but think it has influenced their idea of form. Many primitive peoples say that the soul is a shadow. What do they mean? Max Müller[1] says:

"I do not in the least believe they think the shadow a soul, or the soul a shadow; but they use the word shadow figuratively for that belonging to man, which is like his shadow, definitely individual, and inseparable from him, but unsubstantial. The Mota word we use for soul is in Maori a shadow, but no Mota man knows that it ever means that. In fact, my belief is, that in the original language this word did not definitely mean either soul or shadow, but had a meaning one can conceive but not express, which has come out in one language as meaning shadow, and in the other as meaning something like soul, *i. e.*, second self."

"What we must try to understand is exactly this transition of meaning, how from the observation of the shadow which stays with us by day and seems to leave us by night, the idea of a second self arose; how that idea was united with another, namely that of breath, which stays with us during life, and seems to leave us at the moment of death; and how out of these two ideas the concept of a something, separate from the body and yet endowed with life, was slowly elaborated. Here we can watch a real transition from the visible to the invisible, from the material to the immaterial; but instead of saying that people in that primitive stage of thought, believe their souls to be shadows, all we should be justified in saying would be that they believed that, after death, their breath, having left the body, would reside in something like the shadow that follows

[1] Max Müller: Origin of Religion, p. 86.

them during life. The superstition that a dead body casts no shadow, follows very naturally from this."

The shadow has a certain form, or outline, and is intangible; when the savage says that his soul is a shadow it may be only a comparison.

It is the constant attendant of man during sunshine and pictures him in outline. Brinton notes,[1] "it is of a nature akin to darkness, earth and night."

Schmeltz states that, when the South American Indian wishes to represent the spirit of the deceased, he always gives it the human form. He also calls attention to the part memory plays in this case,—that is, that all phenomena are memory pictures.

If the shadow was not equivalent to the soul, it was, as Frazer[2] thinks, at least regarded as a living part of the man, so that injury done to the shadow was felt by the person or animal just as if it had been done to the body. Ideas expressed among different tribes are as follows:

Zulu (Negro). The soul is thought to be a shadow, having the shape of the body.

Bechuana (Negro). The soul is conceived of as a shadow with human form.

Benin (Negro). They regard their shadows as their souls.

African (other Negro Tribes). It is believed that a man's shadow or shade is intimately connected with his soul, the departed soul of a person being called his shadow or shade. The world of shades is in the region below.

Ojibways. It is described by these people how one of their chiefs died, and while they were watching the body on the third night, his shadow came back into it. The man sat up and then told them how he had travelled to the river of death but had been sent back to his people.

Arawak (Ind.). The word "neja" equals shadow, soul, picture.

Abipones (Ind.). Loákal equals shadow, soul, echo, picture.

Mohave (Ind.). The soul is called shadow. "When a Mojave dies he goes to another country just like his own; it is the shadow of his own country, the shadows of its rivers, mountains, valleys, and springs, in which his own shadow is to stay."

[3]The demons of the Barbar Islands get power over a man's soul by holding fast his shadow or by striking or wounding it.

The Magicians of the Islands of Wetar, of the South Pacific, can make a man ill by stabbing his shadow with a spike, or cutting it with a sword.

Greeks (Homer). Odysseus recognized many heroes in the underworld as shadows. Among them was his mother; but when he went to embrace her she warned him that she was only a shadow.

Reflection.

While some peoples identify soul with shadow, others believe

[1] Myths of the New World, p. 273.
[2] Frazer: The Golden Bough, I, p. 143.
[3] Frazer: I, p. 142.

a man's soul to be in his reflection as seen in water or in a mirror. Frazer[1] has collected considerable data on this conception of the soul.

The Andamanese Islanders think that the reflection seen in a mirror is the soul, while the Fijians believe man to have two souls, a light one and a dark one. The light one is his reflection in water or in a mirror, the dark one his ordinary shadow. The latter goes to Hades. The Zulus will not look into a dark pool because they imagine there is a beast in it that will take away their reflection, causing them to die.

The Basutos of Africa think that crocodiles have the power of killing a man by dragging his reflection under water.

Among the Melanesians, it is believed that if a man looks into a certain pool the malignant spirits get hold of his reflection. If he even glances into it he will die.

According to the ancient Greek idea, to dream of seeing one's self reflected in the water was an omen of death, and Frazer[2] thinks that this is the origin of the story of Narcissus, who, having seen his reflection in the water, pined and died.

Portraits.

The peoples who believe that their soul resides in the shadow or reflection, have a horror of portraits. "For if the portrait," says Frazer[3], "is the soul, or at least a vital part of the person portrayed, whoever possesses the portrait will be able to exercise a fatal influence over the original of it." He mentions some instances of this belief that have been noted. The Canelos Indians of South America think that the soul is carried away in the picture, and it is related that two of them, having been photographed, actually came back the next day to ask if their souls had been taken away. Some of the Wa-teita in Eastern Africa thought they would be entirely at the mercy of the photographer, and the Mandans imagined that they would soon die if their portraits were in the hands of another. Frazer[4] notes that the superstition still exists in various parts of Europe, and it is said that they sometimes pine away and die after being photographed. Some old women of the Greek Islands are thought to have died from this cause, with others perhaps it may prove unlucky, as some of the people in the west of Scotland to-day imagine.

Among the Ainus[5] to speak of the form of a person is equivalent to speaking of his soul, spirit, or ghost. Outlining the

[1] Frazer: The Golden Bough, Vol. I, pp. 145-148.
[2] Vol. I, p. 146.
[3] The Golden Bough, Vol. I, p. 148.
[4] *Ibid.*, p. 149.
[5] Journal of Amer. Folklore, 1894, p. 43.

form on paper was thought to be drawing the soul out and placing it in an unnatural position. It was regarded as a process of transforming a man into a ghost before his time.

Certain Relations of Soul to Body as Expressed Among Some Tribes.

Chinook. The soul resembles fire, and at death sparks are said to fall down. When a person is about to die, the soul is thought to be heavy, but when he is recovering it is light.

Ainu (Japan). The destruction of a body, whatever the form of it may be,—tree, brute, beast or man—is likened to the stripping off of one coat to discover another beneath. The spirit still retains its inner form. Superhuman living forms are thus enshrined in some bodily form.

Chinese. Believe that decapitation makes headless souls in Hades.

Australian. Cuts off the right thumb of the corpse of his enemy so that he cannot throw the ghostly spear with the mutilated hand.

Eskimo. Think that the soul has the same shape as the body to which is belongs, but that it is of a more subtle and ethereal nature. It is pale and soft and cannot be felt.

Tongans. The soul is believed to be the finer, more aeriform part of the body, related to it as the perfume and essence of a flower is to the harder parts.

Caribs. Claim that the soul is visible, but subtle and thin like the purified body.

Romans (Mantanist prophetess) Tertulian De Anima, 9. The soul is thin and lucid, aerial in color, and of human form.

Wuttke (German writer on Ghosts). Ghosts have bodies and a misty, evanescent materiality.

Calmet (Theologian) Vol. I, Ch. xli. Immaterial souls have their own vaporous bodies, bodies provided by supernatural means to appear as spectres; or they may have power to condense the air into bodies.

Forms of Composition.

Wetarese. The soul is likened to the smell of a flower.

Malayans. Believe that the soul escapes through the nostrils.

Siamese. The soul thought to be subtle matter, escaping touch and sight.

Greeks (Epicurus) Diog. Laert., X, 67-8. The soul could neither do nor suffer were it incorporeal.

Romans (Tertullian). The soul is considered material. (1) It is nourished by the body. (2) It cannot be thought of without materiality. (3) A suffering soul must be material. It has human form of an ethereal and light color. It is a clarified, ethereal body.

Hervey Islanders. When the spirit returns from one of its voyages of visit or adventure, some difficulty and excitement is occasioned,—this causes a tingling and enlivening sensation of the body and sneezing.

Bororó (S. Amer.). To sneeze indicates a message from some dead relative,—a spiritual visit.

Similarity to Cloud.

Hervey Islanders. Warrior spirits are thought to constitute the dark clouds of the morning. In cool, cloudy weather the air is thought to be full of spirits. On bright days the spirits take their departure.

Saxony (Seven Cities). When a virtuous man dies, his soul is believed to escape from his mouth as a little white cloud.

Kant died on a nearly cloudless day; only one little white cloud floated in the azure sky. A soldier taking notice of this, remarked, "See,[1] that is the soul of Kant floating toward Heaven."

The Soul as an Object.

That the soul possesses form or shape is the most generally accepted idea; that it assumes the form of some object is also a common belief. The idea of the soul's being a material object can be only the crudest savage notion, and then it is probable that the object has a symbolic significance.

Beginning with the conceptions of ghost and shadow as material representatives of the soul among primitive peoples, Spencer[2] thinks that from the lowest savage to the highest stages of civilization, a serial classification of beliefs can be made, from the purely material to the immaterial. The classification would correspond with progress in lines of culture and civilization.

Few tribes would compare the soul to a lifeless object, or much less identify it as such an object. We cannot well conceive a state of mind so inferior and inactive; one that could form some notion of soul and yet say that the soul and object are one. We must take it for granted that we do not fully understand what they mean. The first consideration is that the savage is unable to conceive of the soul as separated from a body.

"Body and soul,"[3] "form in the thought of the savage an inner association so closely wrought that he is unable to consider the soul without a body or the body without a soul." As a result of this close connection between the body and the soul in the primitive mind, among some peoples the bodies of the dead, especially of malefactors, are destroyed, in different ways, to prevent the return of the soul. The same writer cites numerous instances of practices, such as placing coins on the eyes and mouth, and others of like character, continued even to-day, superstitious customs that have grown out of the identification of body and soul.

The following identify soul and object.

Fijians. They regard the shooting-stars as gods, and the smaller ones as the departing souls of men.

Lithuanians. Shooting stars are supposed to be the souls of dying men.

Nishinam (Ind. of Cal.). When these Indians see the dust columns

[1] Robinsohn: Psychologie der Naturvölker, p. 14.
[2] Sociology, p. 197.
[3] *Op. cit.*, p. 43.

so common in California, they think that some soul is ascending in them to the Happy Western Land.

Algonquins. The story was current among the Algonquins that an old chief having lost his son, journeyed to the land of souls and begged so hard for the soul of his son that the Indian Pluto finally gave it to him in the form and size of a nut.

Form.

Closely related to the last section we have various notions of form and composition of the soul. Tylor[1] says "My own view is that nothing but dreams and visions could have ever put into men's minds such an idea as that of souls being ethereal images of bodies."

What are some of the ideas of form?

The medicine man of the Flathead Indians[2] is able to restore the lost soul to the sick patient. After a preliminary of cantations in the darkness of the night, he kindles a fire and sorts out the proper soul from the store of those of the dead and living people he has on hand. The soul may have the shape of a bit of bone, splinter of wood, or shell, etc. It is restored to the patient first by placing it on his head,—from thence it is supposed to descend into the body.

Eskimo (Angekoks). Claim that the soul is white and yielding and when one attempts to grasp it, he feels nothing, because it possesses neither flesh, bones or nerves.

Hurons. It was thought that the soul had a head and body, arms and legs; that it was a complete miniature model of man himself.

Nias Islanders (West of Sumatra). The individual chooses the size and the desired length and weight of his soul before he is born. "The heaviest soul ever given out weighs about ten grammes." The length of a man's life is proportioned to the length of his soul.

"The[3] sick man's soul is restored to him in the shape of a firefly, visible only to the sorcerer who catches it in a cloth and places it on the head of a patient."

The Dyak priest of Sarawak conjures the lost soul of the sick man into a cup where it is "seen by the uninitiated as a lock of hair, but by the initiated as a miniature human being." It is then supposed to be thrust by the priest into a hole in the top of the patient's head. Sometimes the soul resembles cotton seeds.

"Amongst the Canadian Indians, when a wizard wished to kill a man he sent out his familiar spirits, who brought him the victim's soul in the shape of a stone or the like. The wizard struck the soul with a sword or an ax till it bled profusely, and as it bled the man to whom it belonged died."

Saxons. The soul is considered to have the same form as the body.

---

[1] Prim. Culture, Vol. I, p. 450.
[2] Wilkes: Narrative U. S. Exploring Expedition, Vol. IV, p. 448.
[3] Frazer: Vol. I, pp. 122-139.

Tennyson. "In Memoriam."

"Eternal form shall still divide
The eternal soul from all beside;
And I shall know him when we meet."

Java (Chinese). The souls of dead relatives who have prospered and have been honored are believed to pass over into their posterity.

Susu. It is believed that the spirit of a dead person may take up its abode in the grandchild.

Ideas of Ghosts.

Visible and tangible expressions of soul.

The word ghost has its origin in the German. The German word geist,—ghost is connected with gust, yeast, gas, and even with the hissing of geysers of Iceland. Teutonic gheist comes from the root word meaning to blow with violence. English ghost and gust are derived from the same word.

The Icelandic word geyser, and likewise the Scandinavian gjösa mean to pour forth.

It is very probable that the idea of ghosts is closely connected with that of the breath. The condensation of moisture borne by the exhaled air may have suggested the color. Some ideas expressed by primitive peoples as to ghosts and spirits are as follows:

Negroes (W. Coast Africa). Srahman, "ghost" or "goblin," also means lightning.

Netela. Word "piuts" mean breath and soul.

Eskimo. Silla—air, or reasoning faculty.

Aztecs. Word "ehecatl" had the meaning of wind, of soul, or life.

Yakama (Oregon Ind.). "Wkrisha" expresses wind, "wkrishwit" means life.

Dakota Ind. "Niya" means breath, literally; figuratively, life.

Negroes (East Coast Africa). Flour is offered to spirits who eat the essence of it. Other tribes, *e. g.*, Galelas and Tohelorese of Hulmahera, Dyaks, and Yorubas, believe that spirits consume the essence of food.

Guiana Ind. Always thinks he sees a spirit in any instrument that does him harm.

Adamanese. Death, sickness, and calamities of any kind are attributed to evil spirits.

New Caledonians. White men are believed to be spirits of the dead and are thought to bring sickness.

Africans (Negroes). When a person dies the air is thought to be unusually full of spirits. Much of the noise of the funeral orgie is to drive them away.

West Africa (Negroes). The soul becomes a ghost, but can be seen only by the wong-man or spirit-doctor.

West Coast of Africa (Negroes). Believe in two kinds of ghosts—those who have met sudden death as in battle or accident, and those dying of old age and from disease. The first linger about their former habitations, clad in white and streaked with clay,—they have not completed their proper term of life. The latter are not seen but pass at once into the land of ghosts.

Central Africa. Some of these tribes have their religious doctrines based on belief in harmful ghosts.

Winnebago (Ind.). Believe in wood spirits. They are described as a rather small animal, with round face and glittering eyes, sometimes seen by man. They are believed to be the cause of disease.

Iroquois. The word "uq-skĕn-nĕ" means a spectre, phantom, the ghost or manes of a dead or living body, death itself. It is applicable only to the sensitive soul, not to the rational.

Turanian Tribes (North Asia). The spirits of the dead Shamans are the ones that plague the living.

Patagonians. Believe that the souls of their wizards become evil demons.

Finns. Ghosts are seen by Shamans only, by others in dreams.

Karens. Believe that a man's spirit disembodied before death may appear to announce his death.

Maons. The sight of an absent person denotes his death.

Peruvians. The soul is thought to rise out of the tomb with all that belongs to the body. It roves about, feeling cold, thirst, hunger and toil.

Hervey Islanders. Believe that the spirits of warriors slain in battle wander for a while among the rocks and trees where the body has been thrown, bearing visible marks of the wounds. They utter sounds like those of crickets.

Karens. The "la" or ghost sometimes appears after death and cannot then be distinguished from the person himself.

Araucanians. Think that the soul, when separated from the body, exercises the same functions in another life as in this, unaccompanied by fatigue and satiety.

Natives of the Antilles. Ghosts are said to appear in the roads, but not to every person.

Australians. Ghosts of the unburied dead are thought to become malignant spirits.

(Aborigines). Believe in an evil spirit called "Metagong" which prowls about at night and catches hold of them if they leave the campfire. It is visible occasionally, being of human form and immense size, and of so great strength as to make it useless to offer resistance.

Australians. "The[1] precautions taken by murderers (among the primitive Greeks) to lay the ghost of the slain man were much like those in favor among the *Australians*. The Greek cut off the extremities of his victim, the tips of the hands and feet, and disposed them neatly beneath the arm-pits of the slain man. In the same spirit, and for the same purpose, the Australian black cuts off the thumbs of his dead enemy, that the ghost, too, may be mutilated and prevented from throwing at him with a ghostly spear.

West Africans (Krumen). Europeans are called the ghost tribe. Natives of old Calabar call them spirit-men; Mpongwe call them "ghosts."

Prince of Wales Islands (Darnley Islands Natives). The word used to signify white man, also means ghost.

Chinese. Believe that decapitation makes headless souls in Hades. The souls of beggars and lepers sorely annoy the living.

Israelites. Samuel's ghost was seen by the witch of Endor, but not by Saul.

Greeks. Ghosts are believed to have substantiality, and to drink blood. They recover memory and reason, and recognize their friends,

[1] A. Lang: Mythology, Ritual and Religion, Vol. I, p. 259.

but not until they have nourished themselves from the blood of some victim.

(Achilles to Patroclus.) "Alas, there is indeed then, even in the dwellings of Hades, a certain spirit and image, but there is no body in it at all."

St. Anthony saw the soul of St. Ammonius carried to Heaven in the midst of a choir of angels.

Newly baptized children saw the holy bishop, St. Ambrose, in spirit when he died.

Voices of Spirits, Souls or Ghosts.

One of the attributes of the soul, according to primitive belief, is that of voice. The sounds that the spirit or soul is supposed to utter are sometimes heard in the lamentations or hisses of birds, in the moaning of the winds, or in other peculiar noises which may cause even civilized man when alone at night, to experience a shudder.

Chaimas (S. A. Ind.). The cries of the goat-sucker heard in caverns are attributed to the spirits of their ancestors, and nothing can induce these Indians to enter these dark caves.

Makusi (British Guiana). The cries of the goat-sucker at night are believed to be voices of departed souls which are regarded by them as evil spirits.

Abipones (Ind.). These Indians regard the ducks that fly about at night, uttering hissing sounds, to be the souls of departed persons. They believe to hear their shadows speak in the echo.

Tupinambas (Ind.). The prophetic bird is called "Macanhan." It is regarded as the messenger of deceased friends and relatives. The magicians prophesy from the song of this bird.

Algonquin (Ind.). These Indians think they hear the shadow-souls chirp like crickets.

Fuegians. The soul of the deceased person is believed to wander in the woods; an unfamiliar bird's cry is regarded as the cry of a spirit.

New Zealanders. Divine spirits are thought to converse with living persons (spirits) in whistling tones.

Zulus. Ancestral manes are believed to talk in a low whistling tone, this tone is short of a full whistle.

Arabs. Whistling is considered to be talking with devils.

Eskimo. Ghosts and spirits are thought to manifest their presence by a whistling or singing in the ears.

The Number of Souls.

As to the number of souls there is much difference of opinion among different peoples. The idea of a plurality of souls, however, is very common.

Robinsohn[1] thinks that the idea of more than one soul arose from the fact that sometime after the savage had discovered that there was a life-principle,—something lacking at death—he came, gradually, to comprehend the Ego or I. If this be a true interpretation it affords the basis for a belief in two souls.

[1] Psychologie der Naturvölker, p. 33.

There are some tribes, however, who believe in a number of souls—but on the basis, rather, that certain organic functions are regarded as separate souls. Some of the beliefs are as follows:

Malagasy. Believe in three souls: saina, or mind; aina, or life; and matoatoo, or ghost.

Algonquin. Claim that there are two souls, one of which keeps the body animate, remains with it during sleep and after death (until called to enter another body); the other, a physical soul, moves about at will, goes out of the body during dreams or in a trance, and at death goes to the land of spirits.

Dakotas. Most of this tribe believe in four souls. One wanders about the earth and requires food; a second, watches over the body; another hovers around its native village: the fourth goes to the land of spirits.

Iroquois. Believe[1] in two souls, a rational and a bodily soul. Man is thought to have a sensitive soul, which is the animating principle of his body, and one or more reasonable souls, or psychic entities. Of the latter kind, some persons at times are reported to have four or five, at other times, only one or none at all. The animating, or bodily soul, remains in the skeleton at death. The reasonable is represented as subtile and refined, yet material (since it can be enclosed in a gourd); dark and sombre like a shadow, possessing the form of the body, having head, teeth, body, arms, legs, etc., partly blind by day but sharp-sighted at night. It is carnivorous, but eats the food of the living, and can utter sounds and speech.

Hurons. Think that man has two rational souls, both divisible and material. One leaves the body at death and lingers in the cemetery until the feast of the dead; the other is attached to the body.

Sioux. Believe in three souls, one of which goes to a cold place, another to a warm, comfortable country, while the third watches the body.

Chinook (Ind.). Each person is thought to have two souls, a larger and a smaller one. During sickness the smaller one leaves the body.

Choctaw. Every man is believed to have an outside shadow, shilomlish, and an inside shadow, shilup, both of which survive the body.

Madagascar (Islanders). Believe that there are three elements of the soul. The feelings, "saina," perish at death; the life, "aina" passes into the air; and the spirit, "matoatoa," hovers about the grave.

Eskimo. Believe in two souls, the breath and the shadow.

Olo-Nagadjoe (Dyak of Borneo). Two souls. These are united in the body under the name, "hambaruan." At death, one of these, the "Lian," is separated from the body,—this is the conscious individuality. The other, "Karahang," is more material and remains with the body.

Nias. Ascribed to man three souls, these were identified with the breath, heart and shadow. The first, "noso," comes from the air and returns to it at death, but passes on to posterity. The shadow, "beahn zi-mate," is seen by day, but by the priests at any time. It becomes a spirit at death. The third, "noso-dado," soul of the heart, is the most complete, being the seat of thought, feeling, joy and anger. It exists after death in the form of a spider.

Fijians. Believe in a dark spirit, or shadow, and a light spirit or reflection.

---

[1] Journal Amer. Folklore, 1895, p. 109.

Natives of Tonga. "All men[1] have not souls capable of a separate existence, only the Egi, or nobles, possess a spiritual part, which goes to Bolotoo, the land of gods and ghosts, after death, and enjoys power similar to that of the original gods, but less."

Greenlanders. Some of these believe in two souls, shadow and breath.

Khonds. Have a fourfold division of the soul. The first soul is restored to or absorbed by the good Deity, Boora; the second is attached to the Khond tribe and is reborn in succeeding generations; the third, goes out in dreams and holds spiritual intercourse; and the fourth dies with the dissolution of the body.

Chinese. Believe in three souls and six spirits. The latter being animal go into the ground at death. Of the three souls, one goes down into Hades, the second enters the coffin and is laid in the grave (but not to remain), the third lingers around its old home, and with the second receives the worship of posterity.

Egyptians. Regard the soul of an individual as being a complex of a number of elements, or spirits. These are immortal. One, the "ka," is similar to the man as he appears in thought or dream; another of these immortal parts, "ab," corresponds to the heart; a third, the "ba," is a material conception of the soul, usually a bird, with human head and hands; a fourth part, the "shâu," is the form of a mummy; a fifth, the "xaib," is the shadow; while a sixth "xu," exists as an appearance or reflection of the mummy. (1) ba—warmth of life, breath; (2) ab—heart; (3) xaib—shadow; (4) ka, sâhu, xu, and Osiris—soul comprehended as copy of the body.

Hindus. Distinguish between Brahmatmah, the breath of God, and Jivatmah, the breath of life.

Hindu philosophy. Emanative Souls and Genetic Souls.

Persians (Zoroaster). Soul consists of five parts. (1) The feroher or principle of sensation; (2) boo or principle of intelligence; (3) the rouh, or rouan, the principle of practical judgment, imagination, volition; (4) the akho, or principle of conscience; (5) and the jan or principle of life. The first three united, are the principles which are accountable for the deeds of man. The jan mingles with the winds, the akho returns to heaven and has a separate existence.

Jews (Rabbis). Taught a three-fold division: (1) Nephesh, the animal; (2) ruah, the human principle of life; and (3) Neshamah, the divine soul.

Greeks (Plato). Make three divisions of the soul:

λογιστικον, επιδυμετικου, δυμος or δυμοιδες,

(Aristotle.) Divided the soul into three parts: (1) the mere nourishing soul (anima vegetativa), or plant soul; (2) the sensing soul (anima sensitiva), or animal soul; (3) the reasonable thinking soul (anima rationalis). All three of these parts are supposed to be united during life. The first two die with the body; the third is immortal.

Greeks (Philosophy of Alexander). Taught that the soul consists of two parts. The (πνευμα) Pneuma, corresponds to the Biblical "Neshamah," which God breathed into man. The (ψυχη) Psuche corresponds to the "Nephesh" whose seat is in the blood.

Romans. Believed in a three-fold division of the soul: the manes, the anima, and the umbra. To each of these a different place was assigned.

Romans (Ovid). The shades flit around the tomb; the underworld receives the image; the spirit seeks the stars.

---

[1] Lang: Mythology, Ritual and Religion, Vol. II, p. 25.

(Pliny.) The soul remains on earth, the shade or umbra is removed to Elysium or Tartarus, depending upon deeds.

New Testament Idea (of Jews). Paul, in "The Epistle to the Romans," chapters 8 and 13, mentions bodily soul, intellectual soul, and spiritual gifts. These convey the idea of plurality.

Mediæval Theories. Ascribed three souls to man, the vegetal, the sensitive, and the rational.

LOCALIZATION.

Where did primitive man locate the soul? There were great differences of opinion on this question. Some regarded one organ as central, some another.

The heart and pulse are often pointed out. These parts, as seat of the soul, emphasize the close connection in the belief of primitive man, between what was regarded as the soul and life itself.

Ideas in regard to the HEART are as follows:

Egyptians. The ancient Egyptians thought that the heart was the seat of the soul.

Ancient Hindus. According to the teachings of the Veda, the soul was believed to be located in the heart.

Samoyeds. The heart is believed to be the seat of the soul.

Caribs (Indians). It is thought that there are as many souls as there are pulses that can be felt. The heart soul goes to the gods; the inferior ones roam as evil spirits.

Sacs and Foxes (Indians). The heart is believed to be the seat of wisdom and of the soul.

Winnebagoes (Indians). It is believed that the Great Spirit cut a piece from his body and made man and woman.

Nicaraguan (Ind.). The heart is considered immortal, the immortal part of it making life.

Tonanese. The soul is claimed to be co-extensive with the body, but chiefly in the heart.

Aztec. The heart is considered the seat of the soul; and being the most precious part of the body it is the offering to the gods.

Chancas. The word "sonccon" is used for soul, this word also means heart.

Basutos (Negroes). It is said of the dead, his heart has gone forth.

Ashantis (Negroes). The heart is thought to be the heart of the soul.

Blood.

The blood has been thought by some to contain the soul. This was believed to be the seat of the soul because as it poured forth from the person, or perhaps an animal, life ebbed with it. Homer uses this expression:[1] "The blood flows from the wound and the life (ψυχη) (Psuche) flows from the wound." On the basis of the belief in the life principle of the blood, we have the custom, more common in the past than now, but still prevalent, of mixing of blood as symbolic of bonds of friendship.

Esthonians. Some[2] of these people will not touch blood because

[1] Robinsohn: Psychologie der Naturvölker, p. 18.
[2] Frazer: Golden Bough, Vol. I, p. 178.

they believe it contains the animal's soul. This soul would then enter their body.

N. A. Indians. Some of the Indians of North America believe that the blood contains the life and spirit of the beast and they abstain from its use. To rid the game of any evil that might befall them they pass it through smoke and flame several times to destroy the blood, life, or animal spirits.

Papuan (N. Guinea). These have held similar views about the blood.

Eastern Islanders. Animals[1] for food are stunned or suffocated. This method, it is thought, is to prevent the shedding of blood on the ground. The soul residing in the blood, any ground on which it falls becomes sacred.

Jews. As noted in Leviticus,[2] related also by Josephus,[3] the Jews would not taste the blood of animals they had killed. They either believed that the soul or life of the animal was in the blood or that the blood actually was the soul.

Arabs. These held beliefs concerning the blood similar to those of the Esthonians, N. A. Indians, Papuans, and others.

Romans. Views similar to the foregoing were held. Virgil in his Æneid[4] speaks of the purple blood as the purple soul.

Greeks. The Greek writers,[5] Empedocles, Critias and Galen identify the soul with the blood.

Bones.

Iroquois. A part of the soul was thought to be located in the bones. esken—bone, atisken—soul.

Athapascan. The bones were believed to be the seat of the soul. yani—bone, iyune—soul.

Caribs. The bones of the dead were gathered once a year.

Indians East of Miss. Most of the tribes cared for the bones of the dead.

Breath.

The root *an* furnishes many words for wind, breath, soul and spirit.

Sanskrit { Anila—wind; prana—spirit; atman—self. The word *atman* originally meant breath, then life, sometimes body; but far more freqently, the essence or the *self*.

Greek. (anemos) (*νεμος*)—wind.

Latin. Anima—air, wind, breath, life, soul, spirit. Animus—soul, spirit.

Irish. Anal—breath, anam—life or soul.

The breath is assumed to be the seat of life among some peoples; in most instances its relation to the idea of the soul is conveyed by different meanings attached to the word. "The analogy between soul and breath was so plain," says Baring-Gould,[6] "that it was at once concluded that they were identi-

---

[1] Frazer: Golden Bough, Vol. I, p. 183.
[2] Chap. xvii, 10-14.
[3] Antiquities of the Jews. Book III, Sec. 2.
[4] Book IV, p. 349.
[5] Aristotle: De. An. I, 2, 19.
[6] Origin and Development of Relig. Beliefs, p. 93.

cal, or if not identical, were very similar." Various ideas are expressed as follows:

West Australians. The word "wang" is used for breath, spirit and soul.

Malayans. The soul is said to escape from the nostrils.

Java. The word Ñava is used for breath, life and soul.

Papuans. The words for steam and fog are those used for spirit, rur itam—hot steam—hot spirit—rur aiknand—fog—tree spirits.

Seminoles. A newborn child, whose mother has died, is held above her face in order that it may inhale the escaping spirit.

Mohawks. From the root word "atourion," to breathe, is derived the word "atouritz," the soul.

Slavonian. Duh—breath, spirit; dusa—soul; dounon—to breathe; dyma—seat of force, mind.

Hungarian. Szél—wind; szellö—wind, breath; szellem—soul, spirit.

Sigourney Islanders. Tucho — breeze, breath, air, spirit; dulo tucho—Holy Ghost.

Egyptians. The words ba—soul, bas—bodily warmth, and nafi—breath, were used. In their creation myths, breath means soul.

Hebrews. The word "ruah" sometimes means wind, sometimes life or soul.

Greeks. The word (ψυχη) psuche, is breath or soul from a root expressive of blowing. Psugmos (ψυγμος)—drying effect of a blast of wind, or an effect of cold. From the same radical (πνεω) pneio, to blow,—(πνευμα) pneuma.

Costa Rica Ind. The liver was regarded as the seat of thought and memory.

New England Ind. Soul was believed to be located in the brain.

Natives of Leti, Moa, and Lake Islands. The organs of procreation are thought to be the seat of the soul.

Naudowessies. It is believed that the father gives the child its soul, the mother, its body.

The Karens. Suppose that a being called Tso resides in the upper part of the head, and while it maintains its place no harm can befall the person from the efforts of the personified passions. But if the Tso becomes weak, evil is sure to result to the person. For this reason the hair is carefully dressed and attired, and the head well cared for so as to be pleasing to the Tso.

Siamese. A similar idea is that of the Siamese,[1] who think that a spirit called the Khuan dwells in the head. This is the guardian spirit and must be well cared for, so that the acts of shaving and cutting the hair become ceremonies.

Animals.

Some tribes ascribe souls to animals alone; others, to both animals and plants, extending the idea even further sometimes, so as to include all objects that cast a shadow. Spencer[2] thinks the belief that everything has a soul has been arrived at by a process of reasoning. Beginning with man himself, the savage sees that he breathes and casts a shadow; this he identifies with his other self, or ghost. Then he notes that animals likewise breathe and cast shadows. So he concludes that they,

[1] Frazer: *op. cit.*, Vol. I, p. 188.
[2] Sociology, Vol. I, p. 193.

too, must have another self, or ghost. Thus, the writer thinks, they have passed on from animals to plants and other objects, and, as in the case of the Fijians, to every object. Different writers, students of the condition of primitive man, have noted that he places the animals on an equality with himself, and even regards them in some respects his superior. He will talk to them and, as Tylor[3] relates, in the case of such tribes as the Kafirs, Ainos, Samoyeds, Dyaks, and some Indians, when the game has been killed, he will offer some apology or condonation to the departed spirit of the animal. At night, as Brinton[4] notes, the ways of the animals were guided by a wit beyond the divination of the savage and they were able to gain a living with little toil or trouble. "They did not mind the darkness, so terrible to him, but through the night called one to the other in a tongue whose meaning he could not fathom, but which, he doubted not, was as full of purport as his own." They had sly and strange faculties which he recognized, and he doubted not that at one time he had possessed the instinct of his brute companions. From his close relationship, living and contending with them, we are not surprised that the savage should attribute to animals a spirit akin to his own.

Apaches. The owl, the eagle, and all perfectly white birds were regarded as possessing souls of divine origin.

Maricopas. Believe that after death they will return to their ancient home on the banks of the Colorado River. Then their heads will be turned into owls and other parts of their bodies into different animals.

Aht (Ind.). The soul is thought to issue from gulls and partridges, and after death they will return to their original forms.

Chippeways. Believe that animals have souls, also that inorganic substances, such as kettles, have in them a similar essence.

Fijians. Not only mankind, but animals, plants, and all manufactured articles are believed to possess souls.

Mexicans. Think that because every object has a shadow it has a god.

Algonquin. The hunter is thought to continue his chase in the happy hunting ground, in pursuit of the souls of his game.

The Indians of North America believed that animals had spirits and usually buried some animal with a dead warrior.

Sioux. The bear is regarded as having four souls.

Greenlander. Think that a sick human soul may be replaced with the soul of a hare, reindeer, or of a child.

Hovas of Madagascar. Ghosts of animals are sometimes seen to appear.

Maori. Spirits of dogs are believed to descend to the Hades of the departed.

Kamschadales. It is thought that every creature, even the smallest fly, will live again in the underworld.

Kukes of Assam. The ghost of every animal that the hunter kills will belong to him in the next life.

---

[3] Prim. Cult., Vol. I, p. 422.
[4] The Myths of the New World, p. 122.

Karens. The spirit of the animal is thought liable to wander and suffer injury.

Zulus. Believe that cattle will come to life again and be the property of the dwellers in the world beneath.

Siamese. The butcher beseeches the spirit of the slaughtered ox to seek a happier abode.

Greeks (Pythagoras, Plato). Believed that animals have undying souls.

Romans (Juvenal Sat. XV, 148). Lower animals are said to have the anima but not the human soul, animus.

French (Descartes). Animals are mere machines.

English (Wesley). In the next life, animals will be raised above their state in this life. Horridness will be exchanged for primeval beauty.

English (Adam Clarke). Animals do not sin, are not involved in the sins of man; cannot have adequate happiness in this life, but have it in the hereafter.

Souls Ascribed to Plants.

We find a few definite instances of this belief. No doubt if the subject were investigated more closely, at first hand, it would be found that the soul as the life principle is advocated by most savages. "Plants, partaking with animals," says Tylor,[1] "the phenomena of life and death, health and sickness, not unnaturally have some kind of soul ascribed to them." The idea of a vegetable soul was common in mediæval philosophy, and Tylor thinks that "the doctrine of the spirits of plants lay deep in the intellectual history of South East Asia," but has been superseded by Buddhistic influence.

Society Islanders. Varma, the surviving soul of man, is ascribed to plants also.

Dyaks (Borneo). Ascribe to rice a spirit, the departure of which causes decay of the crop.

Karens. Believe that plants have their souls called "la." The spirit of sickly rice may be called back.

Buddhists. The early belief of the Buddhists was divided. It was a disputed question whether, if plants had souls, they might be lawfully injured or not.

The subject, however, assumes two aspects, closely related to the belief that the plant has a soul similar to that of man. One is, that trees and plants, as held by some tribes, are the abodes of spirits. This superstition naturally leads to tree-worship. The other is, that the tree, as in the theory of transmigration, becomes for a time the resting-place of the human soul.

CONCLUSION.

In this chapter, on primitive ideas of the soul, the following data are presented; (1) Theories as to how an idea of the soul may have arisen; (2) The probable influences of the dream, shadow, breath, etc., in shaping the concept of soul; (3) Data on various aspects of the soul-idea.

---

[1] Prim. Cult., Vol. I, p. 428.

No very general conclusions can be drawn. The soul is most frequently described: first, as shadow; second, as breath; third, as wind; then as life, heart, echo, etc. The dream as the strongest influence in giving birth to an idea of the soul is revealed. This is probably not true for the child, as it is generally believed to be the result of teaching.

Different animal species exhibit certain capabilities, as flight by the birds, swiftness of foot by the deer, etc.; these are impossible feats for the savage, they are acts furnishing food for his imagination, they inspire him, and from the union of such traits he forms his ideal. That is, the inspiration of the savage is got from the special adaptations of different animal species. The primitive idea of soul cannot be classed as psychological, or philosophical. It is connected more or less with superstitious beliefs, and as such may be classified with their religion. By soul the savage probably means life, it is related to no personal God, nor is any thought of mind conveyed in the idea. It is most frequently a shadow-like form of the individual that will enjoy certain favors after death.

Greek Ideas Regarding the Soul.

It may not have been an entirely new procedure for man, to consider, in some crude way, his possessions, to measure up his stock in trade,—so to speak—to compare it with animals or other persons, to consider his power or ability and observe in some way how he is fitted to cope with his environment. It may not have been an entirely new departure for man to try to shape his destiny, to seek to discover the wherefore of his existence, to desire knowledge as to what he actually is in comparison with other things, or what he is expected to do. Is he serving a master? if so, to find out the character of this master, his will, etc., and further to learn something of the material with which he has to deal. The savage world is a great animated one, the dispositions of its numerous inhabitants being very similar to savage life. To the savage the great invisible world is sufficient to account for everything which is not directly observable by the senses. This has sufficed for a long time. It satisfied the dwellers of Greece for a long period. The spirit world is in matter, and is sufficient to account for the cause of things. That these spirits exist, the savage has strong proofs. When he sleeps his soul visits other souls of this spirit world, and when he dies the soul is free to dwell there. Everything has a soul like him; and then, too, there are many things that happen that nothing but spirits can do. This explanation did not always satisfy the Greek mind. Dwelling as they did in a country where intercourse among themselves, as inhabitants of colonies, was easy; partially shut

out from the barbaric world, no longer nomadic, they made great advancement, not only materially, in accumulation of wealth and development of the country, but intellectually, as well. The conditions were favorable for furthering the training of the mind, and were such as perhaps never existed before. With the development of the mind, there began a search for this spirit that ruled; the immortal being that ordered all things. With this search we have the beginnings of the cosmological period of their philosophy. The true relation of man to nature, or the abiding, must relate to that part of him that abides. Three periods of Greek philosophy are generally recognized. During the period of hylozoistic monism[1] the ancient Ionians regarded matter as something living; in itself it was animated just as are particular organisms. This was the first step. It was superseded by dualism in the systems of Empedocles and Anaxagoras. Then the distinction between the spiritual and the corporeal was brought out, also that between matter and force was shown by Empedocles and Democritus. The distinction of true knowledge and phenomenon is a recognition of the mental in the Eleatic school. This is taken up by the Pythagoreans. With Anaxagoras the spiritual is the principle of all being, the material without the impulse of the spirit is nothing. The advent of the idea, the concept-philosophy of Socrates, represents in Plato the dualism of mind and matter, soul and body.

Two courses of influence must be recognized in considering early Greek ideas of the soul. The early cosmologists did not take account of the individual soul in their systems, that was explained satisfactorily by their religious beliefs. The mystery with which they grappled was that of a basal material (Ionians) or fundamental form (Pythagoreans) of the world. It was only after a relation had been established between this world principle and the soul of popular belief that it came to be scientifically considered. Then it was considered in connection with the entire course of the universe.

The fundamental principle Thales declares to be water. He thinks the whole world is full of souls. The loadstone is said to have a soul because it moves iron. What he regarded as soul was something endowed with the power of motion. Why should this first principle have been water or moisture? Aristotle[2] thinks that it was perhaps because the germs of all beings are of a moist nature, or because the nourishment is moist. This is interesting as being one of the first recorded attempts to solve the mystery of life. Living near a body of water was

[1] Siebeck: Geschichte der Psychologie, pp. 27-29.
[2] Met., I, 3. 983, b. 6. (Fairbanks.)

perhaps an influential factor, for Thales thought the earth rested on water and floated like a piece of wood. The solution dealt with motion and mutability. Anaximander considered the infinite or unlimited (something) to be the primitive matter of all things, while Anaximines thought it to be air. All things spring from air by rarefaction or condensation, *i. e.*, by heating and cooling. "Air is the nearest to an immaterial thing; for since we are generated in the flow of air it is necessary that it should be infinite and abundant, because it is never exhausted." Air is the first principle of things; from this all things arise and into this they are all resolved again. "As[1] our soul which is air holds us together, so wind (*i. e.*, breath, *pneuma*) and air encompass the world." This is closely related to the ideas of many primitive peoples who associate soul with breath as the life-giving principle.

These represent the fundamental principles of the Ionic school, two substances are mentioned, the aim being rather to present the thing most essential for life, for animated matter; they were not yet interested in soul. As for Hippo and Diogenes of Apollonia, pupils in the same school, the former regarded moisture as the first principle, while the latter regarded the air as the substance of which all things consist. This substance must be eternal, unchangeable, great and powerful, and rich in knowledge. The air possesses these qualities; it is the essence in which reason dwells.

Some passages from the fragments left by Herakleitos convey some idea of what he meant by his continual flux, and the nature of primitive matter. "All[2] things are exchanged for fire, and fire for all things, as wares are exchanged for gold and gold for wares." "Fire lives in the death of earth, and air lives in the death of fire, water lives in the death of air, and earth in that of water." "Gods are mortals, men are immortals, each living in the other's death and dying in the other's life." "For to souls it is death to become water, and for water it is death to become earth; but water is formed from earth, and from water, soul." "The limits of the soul you could not discover, though traversing every path." "It is a delight to souls to become wet."

"When a man gets drunk, he is led about by a beardless boy, stumbling, not knowing whither he goes, for his soul is wet." "The dry soul is wisest and best." "It is hard to contend with passion; for whatever it desires to get it buys at the cost of soul." "All things are full of souls and of divine spirits." "Man like a light in the night is kindled and put

[1] Aet., I, 3. Dox., 278. (Diels.)
[2] Fairbanks: The First Philosophers of Greece, pp. 25-59.

out." Religious rites are cures for the soul. We learn from Plato and Aristotle that Herakleitos thought all things to be motion; to him nothing abides, all things in the course of time become fire. The first principle is soul, all other things consisting of a fiery exhalation from it. There is a flow of all things upward and downward; the stages are earth, water, air, fire. The qualities of soul are manifested in the exhalations of fire. Unlike the early Ionic cosmologists, we note a trace of religious teaching in his system. Two lines of thought are mingled and in some passages the soul is spoken of in a popular way signifying the person or individual. Then again a trace of the scientific is brought in; but regarding his teachings as a whole, Herakleitos is considered more of a metaphysician than physicist. The teachings of Xenophenes were contrary to the mythology of his time. According to his belief, all things come from the earth and return to it. One God rules; he is supreme. The primitive essence is the divine spirit ruling the universe. For Parmenides the truly existent has the attributes of an abstract conception of being. "Therefore thinking and that by reason of which thought exists are one and the same thing, for thou wilt not find thinking without the *being* from which it receive its name, nor is there nor will there be anything apart from being; for fate has linked it together, so that it is a whole and immovable."

"For that which thinks is the same, namely the substance of the limbs, in each and every man, for their thought is that of which there is most in them."

With Empedocles we have a duality in the sense of opposites and their effects. Love tends to make one out of many, strife tends to make many out of one. Love and strife control things. There are four original elements, fire, air, water and earth. From Aristotle we learn of Empedocles, that, "as many[1] as pay careful attention to the fact that what was soul is in motion, these assume that soul is the most important source of motion; and as many as consider that it knows and perceives beings, these say that the first principle is soul, some making more than one first principle and others making one, as Empedocles says the first principle is the product of all the elements, and each of these is soul."

"And[2] in like manner it is strange that soul should be the cause of the mixture; for the mixture of the elements does not have the same cause as flesh and bone. The result, then, will be that there are many souls through the whole body, if all things arise out of the elements that have been mingled to-

[1] De Anima I, 2; 404 b 7.
[2] De Anima I, 4; 408 a 14.

gether; and the cause of the mixture is harmony and soul." "The soul is a mixture [1] of what is air and ether in essence." Mind and soul are the same. The soul is imperishable. The knowledge we have of Empedocles's ideas of the soul is derived chiefly from other writers. We find that he regarded the blood as the real carrier of life; since it was thought to be the most perfect combination of the four elements. The perceptional knowledge depends upon the combination of elements, and the spiritual nature as he understood it depends upon the physical nature; that is, it is the result of certain combinations.

As to the teachings of Pythagoras and his school, we can only follow what later members say. Little is known of the early doctrine; but it is believed, however, to have been dualistic. It is supposed that they postulated world soul and that the origin of the soul of man was ascribed to this. Some of the Pythagoreans held that solar corpuscles are souls. The soul was considered to be a harmony or a number. From the doxographers we learn that "Pythagoras[2] held that one of the first principles, the monad, is god and the good, which is the origin of the One, and is itself intelligence." "Divine spirits are psychical beings; and heroes are souls separated from bodies, good heroes are good souls, bad heroes, bad souls." "For Pythagoras, who held that the soul is extended through all the nature of things and mingled with them, and that from this our souls are taken, did not see that God would be separated and torn apart by the separation of human souls; and when souls are wretched, as might happen to many, then part of God would be wretched; a thing which could not happen." The harmony of opposites and the essence of number symbolize the soul. The soul is an immortal being passing through stages of perfection in animal life. The body is the prison or tomb of the soul.

Anaxagoras taught that all things have existed from the beginning in infinitesimally small fragments, fragments of gold, fragments of flesh, etc. The task of collecting and arranging these particles was performed by mind, or reason (nous). With Anaxagoras we have an intelligent principle as the cause of motion. This was a great advance in some respects over the mechanical theories of some of the cosmologists. Soul and mind are the same; it is the moving force of matter. He thought that if a being moves itself it must be mind that produces the motion, the motive power coming not from without but from within. For him this motive principle becomes a soul. But since the *nous* exists apart from man, the mental

[1] Fairbanks: The First Philosophers of Greece, p. 226.
[2] Fairbanks: *op. loc.*, pp. 133-153.

process depends on a being outside the world, and there is no natural process of knowledge.

"Other things[1] include a portion of everything, but mind is infinite and self-powerful and mixed with nothing, but it exists alone by itself." For it is the most rarefied of all things and the purest, and it has all knowledge in regard to everything and the greatest power; over all that has life, both greater and less, mind rules. And mind ruled the rotation of the whole, so that it set it in rotation in the beginning."

From Aristotle[2] we learn that many times Anaxagoras "rightly and truly says that mind is the cause, while at other times he says it is soul; for it is in all animals." "Anaxagoras seems to say that soul and mind are different, but he treats both as one in nature except that he regards mind especially as the first principle of all things." In this system the interesting point is the dualism of mind and matter, and the attempt to define mind in relation to matter. Mind being the finest and most mobile of all matter, is first in importance, while matter becomes secondary. Man partakes of a part of this *nous*, and thus is motivated.

The Atomists, especially Leucippus and Democritus, teach that everything is reducible to the full and the void. Being fills space, non-being, void. Being consists of matter, but matter is composed of minute indivisible atoms. These are underived, imperishable and homogeneous, differing only in size and form. There is an infinite number of forms of atoms, mechanical necessity being the unifying principle of the system. The most important element is fire. It consists of the finest atoms, these being smooth and round, and the smallest of all. It is the principle of motion[3] in organisms. These fiery particles are diffused throughout the whole body. There is a soul atom between every pair of body atoms, but the various faculties of the soul have their seat in different parts of the body; thought in the brain, anger in the heart, desire in the liver. On account of the fineness of the soul's atoms, there is danger lest they be forced out of the body by the air that surrounds us; this loss is overcome by inspiration. The body is only the vessel of the soul, and on the latter we should bestow more care than on the former. The excellence of the animal consists in bodily perfection; of man, in moral perfection. The soul is something corporeal like all other things, but more than that, it is the most perfect body. The soul distributed throughout the whole universe is the Deity. Sensation and consciousness are a consequence of the mobility of soul atoms. Thought

[1] Burnett: Early Greek Phil., p. 293.
[2] De Anim. I; 2,404 b.
[3] Zeller: Pre-Socratic Philos., Vol. II, pp. 256-270.

and perception have the same origin; both are material changes of the soul's body, and are occasioned by external impressions —the impact of atoms entering the sense organs.

The elements of early science, combined in the system of Democritus resulted in materialism. The same elements, from the point of view of the Socratic concept, formed the idealistic system of Plato. Socrates, the immediate precursor of Plato, considers the soul to be immortal. His teachings are based entirely on morals; man for him means a seat of moral ideas. For Plato God made the soul out of the following elements: "out[1] of the indivisible and unchangeable, and also out of that which is divisible and has to do with material bodies, he compounded a third and intermediate kind of essence, partaking of the nature of the same and of the other, and this compound he placed, accordingly, in a mean between the indivisible and the divisible and material. He took the three elements of the same, the other, and the essence and mingled them into one form, compressing by force the reluctant and unsociable nature of the other into the same." This is the soul of the universe, and of this, in a diluted form, the stars partake. The offspring of the divine imitating him, "received[2] from him the immortal principle of the soul; and around this they proceeded to fashion a mortal body, and made it to be the vehicle of the soul, and constructed within the body a soul of another nature which was mortal, subject to terrible and irresistible affections . . . they gave to the mental nature a separate habitation in another part of the body." "And in the breast and in what is termed the thorax they encased the mortal soul." "That part of the inferior soul which is endowed with courage and passion and loves contention they settled nearer the head, midway between the midriff and the neck in order that it might be under the rule of reason. . . . . That part of the soul which desires meats and drinks and the other things of which it has need by reason of the bodily nature, they placed between the midriff and the boundary of the navel, contriving in all this region a sort of manger for the food of the body." God gave the "sovereign part of the human soul to be the divinity of each one," this part dwells at the top of the body. The soul existed before it entered the body and had intelligence,—memory still retains certain forms of knowledge—"absolute beauty, and goodness, and essence in general." If these[3] absolute ideas existed before we were born then our soul must have existed before we were born.

---

[1] Timaeus: Jowett, Vol. III, p. 453.
[2] *Ibid.*, p. 491.
[3] Phædo.

The soul is immortal,[1] for that is immortal which is ever in motion; that is, self-moving. Ten thousand years must elapse before the soul can return to the place from which it came; it may then pass into the life of a beast or into a man again. For the lover of knowledge the soul is glued to the body, viewing existence through the bars of a prison. The soul is lasting, the body, weak and short-lived, and every soul may be said to wear out several bodies.

The soul, belonging to the supersensible world, has the qualities of non-origination, indestructibility, unity and changelessness. Since it is the carrier of the idea of life, the cause of its own motion, it is not identical with the ideas. The part relating to the ideas is the directing, reasoning part. The part located in the breast, or courage, belongs to animals; while that found in the lower regions,—that is, desire, or appetite, belongs to plants and animals. These three parts represent three essences combined with each other, and not one essence operating in a three-fold manner,—the soul being their unity. "Each degree[2] has its own theoretic and practical functions in such a way that the lower functions may exist without the higher, but the higher appear in connection with the lower."

One advance which Aristotle made over Platonism was based on his insight into the insufficiency of the theory of ideas to explain empirical facts. The super-sensible world of ideas and the world of sense are identical; the universal does not have a higher actuality, separated from sense objects. Nature is the organic bond of all individuals, which actualize their form in motion, pure form being their highest purpose. Windelband[3] recognizes two parts to Aristotle's psychology, revealing two scientific points of view. (1) The general theory of animal souls, psychical processes possessed in common by animals and men, though more perfectly developed in man; (2) the doctrine of the *nous* as the distinctive possession of man, this view representing the empirical and the speculative sides of his psychology. The soul being that which holds the body together, is indivisible, and has no parts. "It is[4] the first entelechy of a natural organized body, having life in potentiality. 'A double meaning is implied in this definition; either it is the actualization of matter or it is the agent of actualization.

"The soul is not any variety of body, but it cannot be without a body; it is not a body, but it is something belonging to or related to a body; and for this reason it is in a body, and in

[1] Phædrus: Jowett, Vol. I, p. 579.
[2] Windelband: Hist. of Ancient Phil., p. 207.
[3] History of Ancient Phil., p. 276.
[4] Grote: Aristotle, p. 458.

a body of such or such potentialities." We do not say that the soul weaves or builds; we say that the animated subject, the aggregate of soul and body, the man, weaves or builds. So we ought also to say, not that the soul feels anger, pity, love, hatred, etc., or that the soul learns, reasons, recollects, etc., but that the man with his soul does these things. The actual movement throughout these processes is not in the soul, but in the body, sometimes going to the soul (as in sensible perception), sometimes proceeding from the soul to the body (as in the case of reminiscence). Defects in the soul arise from defects in the bodily organism. This is not less true of the *nous*, or intellective soul than of the sentient soul.

"The varieties of soul are distributed into successive stages, gradually narrowing in extension and enlarging in comprehension; the first or lowest stage being co-extensive with the whole, but connoting only two or three simple attributes; the second or next above, connoting all these and more besides, but denoting only part of the individuals denoted by the first. The third, connoting all this and more, but denoting yet fewer individuals, and so on forward." This lower stage is co-existent with life, including both plants and animals.

The nutritive soul connotes only nutrition, growth, decay, and generation of another individual. The sentient soul, belonging to animals, but not belonging to plants, connotes all the functions and faculties of the nutritive soul, and sensible perception (at least in its rudest shape) besides. "We[1] proceed onward in the same direction, taking in additional faculties,—the movent, appetitive, phantastic, noetic soul, and thus diminishing the total of individuals denoted. But each higher variety of soul continues to possess all the faculties of the lower. Thus the sentient soul cannot exist without comprehending all the faculties of the nutritive, though the nutritive exists (in plants) without any admixture of the sentient. Again, the sentient soul does not necessarily possess either memory, imagination or intellect (*nous*); but no soul can be either imaginative or noetic without being sentient as well as nutritive. The noetic soul, as the highest of all, retains in itself all the lower faculties; but these are found to exist apart from it."

Plato's system takes note of three essences, these mingling together form a soul. Aristotle recognizes but one, with different forms of manifestation. The *nous* is not connected with or dependent upon any given bodily organs or movements appropriated to itself; this distinguishes it from the sentient and nutrient parts, which are localized to a certain extent.

[1] Grote: Aristotle, p. 461.

The sentient soul is complete from birth, while the *nous* or the noetic soul enters from without and emanates from the divine celestial substance, the region of Form; the celestial body surrounding the cosmos, and every form that animates matter derive its vitalizing influence from it. But the *nous* belongs essentially to the divine; it comes from without, being a small fraction of the whole soul. There are but few men in whom it is much developed. It is put into action by the abstract and universal, in a certain sense within the soul itself. Of the *nous* the *Intellectus agens* is the constructive function, and the *Intellectus Patiens* the receptive function; the first deals with the universal, it alone being immortal, while the latter agency ceases with the existence of the body. The animal soul is differentiated from the vegetable, principally, because of a greater degree of concentration. The fundamental activity of the soul is thought.

After Plato and Aristotle, no new systems of Greek philosophy were set forth. Greek civilization had begun to decay; the later philosophers were content to follow along in the lines of one or the other of the two great leaders. "Criticism, appropriation, readjustment and remodelling" occupied the minds of the later Greeks and early Romans.

The two schools most sharply distinguished are those of the Stoics and Epicureans. With the decline of the Grecian states, philosophy took on a practical turn; and with Grecian helplessness we have Stoic apathy and Epicurean self-contentment, —peace of mind being the only way to happiness. The central point of the Stoic doctrines is a certain ethical standard, the ideal of the wise man. The moral[1] conduct of man is the chief business of philosophy.

"The matter[2] or substance of which all things are made is corporeal," it is infinitely divisible, everything is subject to change. Heat and cold are the two active elements. In their materialistic view of the world they regard the soul as corporeal. Whatever influences the body, or is united with it, or is itself influenced by it and again separated from it, must be corporeal. It has extension in three dimensions over the body, and whatever has three dimensions is corporeal. Animal life, the cause of thought and motion, is kept in health and nurtured by the breath, therefore the mind is nothing but fiery breath. For some Stoics the soul is fire or breath, or warm breath diffused throughout the body. The warm breath is connected with the blood, the soul being fed by its vapors as the stars are fed by vapors from the earth. One part of the

[1] Zeller: Stoics, Epicureans and Sceptics, p. 56.
[2] *Ibid.*, p. 194, *seq.*

soul is transmitted to the young in the seed. There arises, by development within the womb, first the soul of a plant; this becomes the soul of a living creature, after birth, by the action of the outer air. Some thought the soul must reside in the breast, because the voice bearing the thought arises in that part of the body; others thought it was located in the head. For the former location, eight parts of it were recognized; the *hegemonicon* or governing part, situated in the breast, the five senses, the faculty of speech, and the generative force. The soul is a unity, reason or the *hegemonicon* is the primary power; the other powers are parts of this,—derived from it. Feeling and desire are also derived from it. The individual soul is related to the soul of the universe as a part to the whole. It does not possess activity independent of the world-soul, neither may it last till the end of the world's course.

The Epicureans likewise held a materialistic view. According to their system of philosophy, knowledge of natural causes is the only means of liberating the soul from superstition. This is the value of natural science; the thought of God and the fear of death compelling us to study nature. Bodily reality is the only form, corporeal,[1] the only substance. The origin of the world is the result of atomic unity. The soul is a body, but is composed of the finest, lightest and most easily moved atoms; this is proven by the speed of thought, instantaneous dissolution of the soul at death, and the fact that the soulless or dead body loses no weight. For Epicurus[2] the soul is the cause of feeling; the elements of it are received by the child from the parent's soul at the time of generation, it is spread over the whole body and grows as the body grows. The rational part has its seat in the breast; the irrational part is diffused as a principle of life over the whole body. Mental activity, sensation and perception, the motion of the will and the mind belong to the rational part. The mind may be cheerful while the irrational soul may feel pain, or the latter may be lost by the mutilation of the body—without detriment to the rational soul. The soul cannot exist when its connection with the body is severed, its light atoms are dispersed in a moment. When the soul is destroyed the body is also destroyed, for it cannot exist without the soul. Atomic particles thrown off by bodies, come in contact with our bodies and cause sensations.

Among the Eclectics, the later philosophers attempted to blend the different schools. Asclepiades thought the soul to be the whole compounded of all the senses, with a substratum, the *pneuma*, consisting of light round particles. Posidonius

[1] Zellar: Stoics, Epicureans and Sceptics, p. 439.
[2] *Ibid.*, p. 454.

thought the emotions arose, not from the rational soul, but from courage and desire, two separate faculties, distinct from reason. Cicero regarded the soul as an emanation from the Deity, an essence of supernatural origin.

If we glance back briefly over Greek philosophy as a whole, we find, in this retrospective view, a general tendency toward idealism.

The early cosmologists made no break with their mythical religion, but sought rather the basis of matter, the enduring part of it; or, in other words, since matter was considered to be animated, they sought that on which the life principle depended. A gradual dualism was formed, which resulted in the idealism of Plato, the stages of which may be traced as follows: (1) the teachings of Empedocles, embracing the theory of opposites; (2) the form of Pythagoras, believed to represent dualism; (3) the *nous* of Anaxagoras, in which the mind was predominant over matter.

Explanations of mental phenomena tend to sever the connection of soul with the life function and associate it with mind. The development of ethics has been instrumental in this change of idea. Localization of a part of the soul in the region of the abdomen, harmonizes with the modern theory of the emotions. Greek theorists regarded the soul as a substance, many of them taught that it was composed of particles of matter of some kind.

Theological Ideas of the Soul.

Any historical study of the soul beginning with the decline of Greek Philosophy, must recognize the following principles: (1) religious ideas of the soul are oldest, are found among all primitive peoples, have existed at all stages of civilization, and form whatever ideas of the soul most civilized peoples have today; (2) from time to time certain philosophers have attempted to define the soul on the basis of the relationship between God, the universe and man; (3) more recent psychologists have attempted to state the relation existing between the soul and the mind. Keeping these principles in mind, the writer has thought best to treat the subject under the following headings: Theological, Philosophical, and Psychological theories of the soul.

The Theological Idea. The conception of the soul formed as the result of religious teaching is more common than that derived from any other source. That is, while there may be no generalized idea of it in which all people agree, the masses of the people, if they have any formulated idea of its existence, have probably gotten it through their religious teachings, it being in definite relations to their idea of God. The idea in-

volves a material substance of some kind, which, as such, continues to exist after the death of the individual. In fact, so general is such a belief among religious peoples (and little removed from the primitive idea yet), especially among Christians, that here in this crude yet general belief a great soil or matrix is formed which has almost become inherent. The theological standpoint is least removed from that of primitive man, is more generalized than any other, and so naturally falls first in the line of treatment. Hagenbach[1] observes: "The inquiry into the origin of the human soul, and the mode of its union with the body seems to be purely metaphysical, and to have no bearing upon religion. But, in a religious point of view, it is always of importance that the soul should be considered *as a creature of God.* This doctrine was maintained by the Catholic church in opposition to the Gnostic and heretical theory of emanations."

An historical treatment of the subject, from the monotheistic point of view existing in Christian religions to-day, has more meaning if we take up the threads of connection that lead back to Grecian philosophy, and especially those that lead to Jewish theology. At the time of the Christian era these two lines of influence had begun to mingle. This is noticeable in the material ideas of the later Stoics; the doctrines of this school is an elective one, many of their teachers are essentially Christian, while they attempt to cling to Grecian philosophy. The immediate influence of this school was most potent on the early Christians. The stoics taught that the Pneuma (πνευμα) is corporeal, yet it has the attributes of mind. In this is a trace of the influence of Hebrew doctrines. For the latter the word *Ruach*, corresponding to Pneuma (πνευμα) had a material meaning, *i. e.*, it meant something that God breathed into man. It was for them a semi-force, a vital element at least, something that could exist apart from God. Philosophers before the time of the Stoics had regarded the Pneuma (πνευμα) as the vital force of the body, and in fact the soul itself; but the latter class looked upon everything that is real as being corporeal, and the human soul as a fragment of God. The main channel, so to speak, of Grecian philosophy culminated in the teachings of Plato, terminating in idealism; this line of thought was further worked out in Neo-platonism. The systems of Greek philosophy, condemned and pointed out the errors of the early Greek religions, but offered no substitute. The effect of this was that the later Greeks, without a satisfactory religion, were ready to take over and work into their systems of philosophy, what seemed best of the teachings of Christ. Stoic[2] philosophy rep-

[1] History of Doctrine, Vol. I, p. 211.
[2] Drummond: Jewish Alexandrian Philos., Vol. I, p. 131.

resents a transition; the two streams of influence mingle and were brought together by them.

The doctrine of the Logos reached its highest development with them prior to the Jewish and Christian influences. Their later doctrine is really a passage from philosophy to religion; from a system of thought elaborately worked out to the bold declaration of truths borne in upon the mind, announced as the word of God, but without system. The work of outlining and harmonizing these conflicting streams of thought constituted the chief debates and discussions of the church Fathers. Their conception of the soul must harmonize with the teachings of the Bible, the ideas previously held by the Jews, and the Christian concept in general. This concept represented it as something similar to breath, as something material that might influence or be influenced for good or evil, or that might endure suffering, or enjoy pleasures.

Some of the Church fathers accepted the Neo-platonic doctrines, this being true especially of those located in Greece and Egypt; while the Latin Fathers, as Tertullian, Arnobius and Lactantius, rejected philosophy as a heathen product, which must be avoided. But the[1] very opposition of Christian doctrine to early philosophy compelled the Fathers to study the latter to offset attacks and in this way it came more readily to be reduced to dogma, to be formulated and systematized.

Of the different ideas of the soul's origin, Alger[2] mentions six, four of which have been held at different periods and debated by the Church Fathers. The first he mentions is that of emanation. This theory is constructed from the results of observation by analogy. It is a wide-spread belief of the present day, being one of the teachings of Hindu philosophy. Some of the analogies on which it is based are: the annual developments of vegetable life from the bosom of the earth; the preservation of the properties of drops of water taken from a fountain; the separation of the air into breaths, and the soil into atoms; the utterances of tone gradually dying away into echoes; the radiation of light from a central origin, etc. The second theory of the soul's origin is that of a previous existence. This view was wide-spread among oriental thinkers, also among Greek philosophers and some of the early Church fathers. There are two forms of the doctrine: one, that the soul has existed below man and is on an ascent upward; the other, that the former existence of it has been above that of man and that voluntarily, or from some cause it has descended to the rank of man. The third view is that the soul is created directly by the volun-

[1] Weber: History of Phil., p. 186.
[2] The Doctrine of a Future Life, pp. 410.

tary power of God. The ideas of this theory have been modified at times, some holding that all souls were created by a divine decree at the beginning of the world, while later theologians of the middle ages claimed that God breathes a soul into each new being. A fourth theory, held by Tertullian, was that of Traduction; that is, that all human souls have been brought over from the soul of Adam. The two views of the theory are: (1) All souls are developed out of the one substance of Adam's soul; (2) the eating of the forbidden fruit corrupted all the vital fluids of the original Mother Eve. All these theories have their objections. Viewed from the standpoint of modern science, some of them seem absurd, yet they served a valuable purpose in their time and place.

Draper[1] notes that there are two systems of philosophy. One recognizes a personal God, who exists apart and creates the immortal souls of men; the other recognizes an Impersonal Intelligence—an indeterminate God, from whom the soul emerges and to whom it again returns. Under the latter system, beings are created from nothing or developed through an evolutionary process.

Philo[2] the Jew was one of the earliest of those whose writings tended to unite Judaism and Hellenism. He taught that we possess life or soul in common with the irrational animals; but that the power of intelligence is peculiar to mind. Man is a dual, soul and body, and forms the borderland between the mortal and the immortal, the earthly and the divine. The soul possesses three properties: perception, by means of which the mind receives impressions through the senses, mental representations, and impulse. Impressions received through the senses are stamped on the mind like a ring or seal, like an impress made upon wax, and so are capable of being reproduced. They are retained until oblivion. Impulses fall either under the heading of aversion, or of desire. Man differs from the brute in that he is "two-natured," animal and man. The animal shares the vital power with the irrational creatures; man possesses the rational principle in addition to the vital element, and these constitute the soul. Like Plato he distinguishes three parts of the soul, one part being rational, a second, high spirited, third, he represents as the seat of desire. The irrational soul is explained in a way that harmonizes with the view expressed by Moses[3] in the Old Testament, *viz.*: "The soul of all flesh is blood." Mind is God to the irrational soul. This rational principle, *nous*, mind, was thought to consist of an "ethereal fire nature," yet spirit (with which it was

[1] Conflict between Religion and Science, p. 140.
[2] Jewish Alexandrian Philosophy. Drummond. Vol. I, pp. 314-59.
[3] Gen. IX, 4.

supposed to be in connection) was regarded as incorporeal. Justin Martyr, Athenagoras and Theophilus were three of the early Roman Fathers who lived soon after the time of Philo. They recognized in the teachings of the Greek philosophers the activity of the Divine Logos. The early Greek writers, McConnell thinks,[1] brought to the new religion the Platonic idea that the individual soul is indestructible, is, in fact, an articulate portion of the substance of the mind of God. Those of Roman antecedent having no inherited beliefs in a future life of any kind were better prepared to comprehend the truth of Christ. The interaction of all these fragments of earlier philosophy produced a confusion and uncertainty of mind which was not clarified for five centuries. For Justin Martyr body and soul constitute one whole; like oxen they made one team, being able to accomplish alone as little as one ox in plowing. He expects the resurrection both of the just and the unjust. A proof of this is the recognized fact that departed human souls are even now in a state of sensation; they may be evoked by Magi and Seers.

Theophilus[2] expresses himself thus: "If thou sayest, 'show me thy God,' I answer, 'show me thy man, and I will show thee my God.' Show me first whether the eyes of the soul see and the ears of the heart hear; for as the eyes of the body perceive earthly things, light and darkness, white and black, beauty and deformity, etc., so the ears of the heart and the eyes of the soul can perceive God. God is seen by those who can see Him when they open the eyes of their soul. . . . . The eyes of the soul are darkened by sin, even by their sinful actions. Like a bright mirror, man must have a pure soul. If there be any rust on the mirror, man cannot see the reflection of his countenance in it; likewise, if there be sin in man, he cannot see God."

Clement of Alexandria mentions a tenfold division[3] of man analogous to the decalogue, the basis of the division being the more general one of body, soul, and spirit. He follows the example of Plato and divides the soul into three faculties.

Writers of Christian philosophy have usually indicated certain well defined periods of time as characteristic of some particular phase of the subject. There are several of these classifications. According to Hagenbach the first period in the development of Christian philosophy, extending to the death of Origen, is that of Apologetics; the second, from 254 A. D. to 730, is the age of polemics.

In his philosophical teaching Origen was an idealist and in part

[1] The Evolution of Immortality, p. 46.
[2] Hagenbach: History of Doctrine, Vol. I, p. 136.
[3] *Ibid.*, p. 210.

represented the Platonic idea and also the doctrine of Aristotle, while at the same time he was conforming to Jewish theology. He believed in the pre-existence of the soul, and regarded its incarnation as a punishment for former sins. Matter, he thought, is not external; it is the root of evil in man. The Bible was held to be inspired. By inspiration[1] he meant "not the pouring in of foreign thoughts, but an exaltation of the powers of the soul, whereby prophets were elevated to a knowledge of the truth." The soul is immortal, the resurrected body perhaps takes the shape of a sphere. This latter view was also held by some of his followers. As a proof of the pre-existence of the soul he cited scripture in the following: [2] "If the soul of man is formed only with the body, how could Jacob supplant his brother in the womb, and John leap in the womb at the salutation of Mary?"

The ideas of Tertullian[3] were in many respects opposed to those of Origen. He is regarded as one of the Christian philosophers, though he was materialistic in his conception, and taught Stoic doctrine. He recognized two parts of man: soul and body; both material, and both having the same form. The soul, he thought, is delicate, luminous, and aeriform, in substance; for if it were not material it could not be acted upon by the body, nor would it be capable of suffering, and its existence would not depend upon the nourishing of the latter. The soul of the child comes from the semen of the father, like a shoot from the parent-stock of a plant. Every human soul is a branch of Adam's soul. The spiritual qualities of the parents are transmitted to the children, hence the universal sinfulness of the children of Adam. Associated with the name of Tertullian we have the doctrine of Traducianism, he being generally regarded as the founder of this. The doctrine is, that souls are propagated by souls as bodies are by bodies. This was a prevailing belief until the time of Anselm. The Apostolic[4] Constitutions teach that in the primal beginning, likewise after conception, God creates the soul into that which is becoming man.

The teachings of Origen and Tertullian may be contrasted as follows: The former was an idealist to the extent of abstracting everything from God that would tend to bring him down towards men. God is animate, but sustains and fills the world. The term "man" is often used for man's spiritual part, conveying the idea that man consists essentially of soul. The soul pre-exists; death by sin is separation from God; the

[1] Hagenbach: *op. cit.*, p. 120.
[2] *Ibid.*, p. 212.
[3] Ueberweg: Hist. of Phil., p. 305.
[4] Delitzsch: System of Bib. Psychology, p. 129.

blessed dwell in the aerial regions, paradise is a happy island; after death the soul passes through successive stages of happiness, arriving at last, after the final judgment, to the perfection of blessedness, the Kingdom of Heaven. This represents the idealism of the east, peculiar to the Alexandrian school. Tertullian uses figures from the human form to describe God: eyes, ears, tongue, hands, feet, etc., being associated by him. The soul is corporeal, having the outlines of the body,—it does not pre-exist; it is reflected in man, and is immortal, the body and soul are united after the final resurrection. Tertullian, having been born in Carthage, reflects more truly the state of affairs as found in the West.

The doctrines of Arnobius and Lactantius may be considered together, since these two African Fathers were associated as teacher and pupil. The former opposed the Platonic doctrine of the reminiscence of knowledge, and denied that the soul is by nature immortal, for this must be an act of God's grace; the latter believed in the doctrine of Creationism. His belief in immortality he justified on the grounds: (1) of the testimony of the scriptures; (2) since God is incorporeal, and can exist without a body, we may believe as much for the soul. The soul is born with the body, and as opposed to the idea of Traducianism, he argued that intelligent parents sometimes have stupid children, and *vice versa*. The shaping influence of ideas, as those expressed, is often found in the ground work of a larger movement,—they may represent merely the reflection of other forces at work—such an one was Neo-platonism. This movement in thought was the culmination of Greek philosophy. The germ deposited by Philo was developing into a vital theology and an endeavor to found a new church was being made. The doctrines set forth in Neo-platonism were chiefly ethical; God was defined as an abstraction, and unlike the Christian movement was impersonally related to man. Plotinus was the chief exponent. His teachings and the teachings of Neo-platonism in general, had its influence on church doctrines, on the side of idealizing thought and leading toward mysticism. Plotinus[1] thought the soul was the image ειδολα and product of the *nous*, just as the *nous* is of the One. The soul is inferior to the *nous*, though none the less divine, and endowed with generative force. Coming forth from the *nous* (it includes in itself the world of ideas) the soul extends itself, as it were, into the corporeal, just as the point extended becomes a line; there is, therefore, in the soul an ideal, indivisible element, and a divisible element which goes to produce the material world. The soul is an immaterial substance, not a body,

[1] Ueberweg: Hist. of Phil., Vol. I, p. 249.

not the harmony nor the entelechy of the body, but inseparable from the latter, since not only the *nous*, but also memory and even the faculty of perception and the psychical force which molds the body, are separable from the body. The soul permeates the body as fire permeates the air.

It is more correct to say that the body is in the soul than that the soul is in the body; there is, therefore, a portion of the soul in which there is no body, a portion for whose functioning the co-operation of the body is unnecessary. But neither are the sensuous faculties lodged in the body, whether in its individual parts or in the body as a whole; they are merely present with the body, the soul lending to each bodily organ the force necessary for the execution of its functions. Thus the soul is present not only in the individual parts of the body, but in the whole body, and present everywhere in its entity, not divided among the different parts of the body; it is entirely in the whole body, and entirely in every part. The soul[1] is divided, because it is in all parts of the body, and it is undivided, because it is entirely in all parts and in every part. The soul is *per se* indivisible, being divided only as related to the bodies into which it enters since these could not receive it if it remained undivided. It is essentially in the *nous*, as the *nous* is in the *one;* but the soul contains the body. The Divine extends from the One to the soul. The soul, in virtue of its mobility, begets the corporeal.

The soul stands between the *nous* and the phenomenal world; the *nous* penetrates and illumines it, but the soul itself comes in contact with the phenomenal world. Its nature and definition identifies it with a world soul, composed of many of like nature. As pure intelligence it has neither appetite nor desire; the part which is inferior to intelligence, and capable of having desire, proceeds from the intelligible world. The soul, at first, shares with the universal soul the care of administering the entire world, without entering it; afterwards wishing to administer part of it only, it separates itself from the universal soul and passes into a body. But even then it does not give itself entirely to the body, for a part of it remains outside of the body; thus its intelligence remains impassible.

Plotinus taught the doctrine of Emanation. This he presented somewhat as follows: the universal soul embraces a multitude of individual souls; these being desirous of a separate existence, independent, separate themselves from the soul, —the great common principle—and enter a body. These individual parts are perfect in themselves. They finally return, after their mission is fulfilled, to this absolute unity. This

[1] Harnack: Lehrbuch der Dogmengeschichte, p. 776.

doctrine is found in the Buddhistic teachings, according to which the soul gradually reaches Nirvana. Averroes presented it among the Saracens. In their religion[1] it is claimed that the intelligent principle or soul at death is absorbed in the universal mind, or active intelligence, the mundane soul,—which is God, from which it emanated. The individual, or passive, or subjective intellect is an emanation from the universal, and constitutes the soul of man. In one sense it ends with the body, in a higher it endures, absorbed by the world soul, in unity with it. Vedic theology teaches that "There is in truth but one Deity, the supreme spirit; he is of the same nature as the soul of man." The Institutes of Menu affirm that the soul emanates from the all-pervading Intellect, so is destined to be reabsorbed.

Since the work of the early Fathers was largely that of presenting and defending Christianity, it dealt more with the historical past and what had been taught than with a strict analysis of their own experiences. The first one to really begin an analysis of the mind and the inner experiences, was Gregory of Nyssa. He was followed soon after by Augustine, of whom it was said that he established the Christian doctrine of the soul once for all. Gregory of Nyssa is considered by some[2] the most important of the Oriental Church Fathers. He regarded man as the highest unfolding of psychical life, "the crown of creation, its master and its king." The idealization of the world of sense was the chief feature in his analysis of this psychical life, nature was transformed into psychical terms, reality was recognized in spiritual ideas. The soul is a "self-sufficient substance[3], which is always in motion, and to which rest would be annihilation. It fills the body not materially, but dynamically, as light penetrates the air. It is not properly speaking in the body, the body is in it. The power[4] of thought is not an attribute of matter, if it were, matter would show itself endowed with it, combine the elements, and form works of art. As separable from matter, the soul in its substantial existence is like God, resembling him as a copy resembles the original. Since it is simple and uncompounded, the soul survives the dissolution of the composite body, whose scattered elements it continues and will continue to accompany, as if watching over its property, until the resurrection, when it will clothe itself in them anew. The essence of the soul does not contain anger and desire; these belong to its varying states; they are not originally a part of ourselves and we must get rid

[1] Draper: Conflict Between Religion and Science, p. 139.
[2] Windelband: Hist. of Phil., p. 254.
[3] Janet and Seailles: Hist. of the Problems of Philos. Vol. II,, p. 193.
[4] De Hom: pp. 192-206.

of them, they mark us with the brutes. Our bodies are like the coats of skins with which our first parents were clothed after the fall; they are transient.

The consummation of all these beliefs and doctrines was reached in Augustine. In all times the masses of the people have been led in their beliefs by the advance guard,—a power usually centered in one person. St. Augustine represents the high water mark of his era, and at the same time marks the beginning of a new. The only theologian of the practical Roman type of mind that had produced thus far a philosophical consideration of his faith. It has been said of him that "No[1] single man has ever exercised such a power over the Christian Church and no one mind ever made such an impression upon Christian thought." If the doctrines of the church have any influence in moulding our theological ideas, then Augustine has had a great influence. Dogma was perfected with his system. He taught[2] that the soul is immaterial, there are found in it only functions, such as thought, knowing, willing and remembrance. It is a substance or subject and not a mere attribute of the body. It is spiritual because it is the subject of thought, that is, it cannot be an attribute of that which does not think. It feels each affection of the body at that point where the affection takes place, without being obliged to move itself to that place; it is, therefore, wholly present within the entire body, and in each part of it,—while the corporeal with each of its parts is only in one place. A body has only figure, one form; it cannot become the figure and form of another body; the mind can in loving, love both itself and that which is other than itself; in knowing, know itself and that which is other than itself; hence, while memory, intellect and will share in the substantiality of the mind, they differ in this respect from mere accidents, as color, or form, of a substratum. Understanding can know itself, memory can remember that we possess memory, *i. e.*, the soul is conscious of itself as such and each of its parts. The union of soul and body cannot be scientifically explained for man is, as it were, a third substance formed out of two heterogeneous substances. The body does not act on the soul, it is the soul in the body acting on itself. The metaphysics of Augustine is built up on the knowledge of the finite personality. The three aspects of the psychic reality are idea, judgment, and will, and from these he seeks to gain an analogical idea of the mystery of the Trinity. Will is the central element of consciousness. "The leading[3] motive

[1] Very Rev. J. Tulloch: Enc. Brit., Vol. III, p. 75.
[2] Ueberweg: Hist. of Phil., Vol. I, p. 342.
[3] Windelband: Hist. of Phil., p. 281.

in this is doubtless the man's (Augustine) own experience; himself a nature ardent and strong in will, as he examined and scrutinized his own personality he came upon the will as its inmost core." The becoming conscious of an act of perception is an act of the will. Physical attention and likewise activity of inner sense have a dependence on the will. Whether we bring our states and actions to consciousness, the thinking of the intellect, judging and reasoning,—all these is determined by the will for it determines the " direction and the end according to which the data of outer or inner experience are to be brought under the general truths of rational insight."

The existence[1] of the soul is proved by thought, consciousness and memory. If one is in doubt as to his existence, to doubt, means to think, and to think *is* to exist. If the soul were made of fire, or air, or any other material, we would know it by an immediate perception, its substance differs from all known matter, and matter in general, for it contains the notions of the point, the line, length, breadth, and other conceptions, which are incorporeal. The immortality of it follows from its rational nature. Reason brings the soul into communion with the eternal truth, in fact the soul and truth are, as it were, one substance. The human soul is passive, receptive, and contemplative, death to it means its separation from truth. The senses furnish it knowledge, of sensible things, the spirit is instrumental in giving the soul knowledge of a moral or a religious character, a terrestrial light surrounds the corporeal body, a spiritual light environs the soul; this interior light is God himself dwelling within us. The history of mankind is divided into six periods corresponding to the six days of creation, in the last of these we live.

There are general ideas which have the same objective validity for every one, and are not like the sense perceptions conditioned by subjective conditions. Mathematical truths are of this kind, as $2+3=5$; the higher metaphysical truth belongs to this class, *i. e.*, it is truth in itself, absolute. This absolute truth demanded by the mind is God himself. Reasoning in this way Augustine is said to have given the first proof of the existence of God. The principal points of his doctrine may be stated as follows: The soul exists, it can be proven, it is a substance, its origin is in God, it is immortal and does not preexist; it grows from two sources, the external world and the spiritual world; separation from truth is sin, its basis is in the will.

The activity of the church in forming doctrine ceased with the creed set forth by Augustine. Adjustment internally is the

[1] Siebeck : Geschichte der Psychologie, Part II, pp. 381-397.

next step. How far the influence of Augustine's doctrine would extend was not comprehended at that time. But to the time of the Reformation, in church controversies, reformers identified themselves in many instances as in favor of or opposed to certain of Augustine's theses. Mention may be made of two or three of Augustine's contemporaries or successors. They contribute little, but it is interesting to note that they take up the threads of analysis.

Nemesius[1] discussed the soul from a psychological standpoint; it is an immaterial substance, involved in incessant and self-produced motion. From it the body receives its motion. It existed before it entered the body. It is eternal, like all supra-sensible things. It is not true that new souls are constantly coming into existence, whether by generation or by direct creation. The opinion is also false that the world is destined to be destroyed when the number of souls shall have become complete. Nemesius rejects the doctrine of the world-soul and of metempsychosis; in considering the separate faculties of the soul, in regard to the freedom of the will he follows Aristotle.

Claudianus Mamertus[2] claimed that all creatures, and therefore, the soul among them, fall within the sphere of the categories; the soul is a substance and has quality; but it is not, like material substances, subject to all the categories; in particular, quantity in the usual spatial sense of the term, cannot be predicted of it; it has magnitude, but only as regards virtue and intelligence. The motion of the soul takes place only in time and not like that of material objects, in time and space together. The world, in order to be complete, must contain all species of existences, the immaterial, therefore, as well as the material. The former of these resembles God by its non-quantitative and spaceless character, and is superior to material objects, while, by its creature-ship and its subjection to the category of quality and to motion in time, it differs from the unqualitative and eternal God, and resembles the material world. The soul is not by, but environs the body, which it holds together.

Cassiodorus[3] thought that man alone has a substantial and immortal soul, the life of the irrational animals has its seat in their blood. The human soul, in virtue of its rationality, is not, indeed, a part of God, for it is not unchangeable, but it can determine itself to evil, and at the same time is capable, through virtue, of making itself like God; it is created to be an image of God. It is spiritual for it is able to know spiritual things. The soul is present, in its entirety in each of its parts;

[1] Siebeck: Geschichte der Psychologie, p. 398-400.
[2] Ueberweg: Hist of Phil., Vol. I, p. 354.
[3] Ueberweg: Hist. of Phil., Vol. I, p. 304.

it is everywhere present in the body and not limited by a spatial form.

Taking a general view of this early period, embracing the time of all the church fathers, Spencer notes:[1]

"The majority of the early fathers believed that the soul was corporeal. Amongst the pagan writers there was a progressive effort to conceive of the soul more purely; some made it a vapor, a breath, a fire. The same tendency existed among the Christians; 'still the idea of the materiality of the soul was more general among the Christian doctors from the first to the fifth century, than among the pagan philosophers.' It was against them that certain fathers maintained its materiality, so that it should be rewarded or punished after death. In Gaul—Faustus, Bishop of Riez, in the fifth century, maintained that God alone is incorporeal, and that the soul occupies a place, is enclosed in a body, quits the body at death, and re-enters it by the resurrection."

Scholasticism offered little in advance over what the Patristic fathers had set forth; on the whole was rather a relapse to former ideas. Controversies as to the details of a broader doctrine often occupied the best minds. Augustine's analyses and methods, the translation of Aristotle's metaphysics and a general survey of the Greek culture and philosophy, brought forward the problem of Being, initiated the controversy over universals, and evoked a discussion of the questions of nominalism and realism. These questions pertaining to the reality of the individual and the universe, all had their influence; this much was a fact, whatever and wherever reality exists, since the soul's abode hereafter is with God, there must be a similarity, in composition and nature, or whatever of his being exists in man; that constitutes the immortal part. Christianity in the earlier centuries was allied to the idealism of Plato; the return to Aristotle gave rise, during the mediæval period, to the opposed doctrines of nominalism and realism. This dispute can be traced back to fundamental ideas set forth by these philosophers.

Erigena, during the ninth century, taught[2] that everything living comes from something that has previously existed. The visible world is an emanation from God. The "soul of the world" of the Greeks is nature. The particular life of the individual is therefore a part of the general existence of the mundane soul. All things return to God, the soul of the "universal Intellect." The soul returns to its previous state. Sometimes the doctrine of Plato prevailed during the Middle

[1] Outlines of Sociology, No. VIII, p. 121.
[2] Draper: Conflict Between Science and Relig., p. 125-6.

Ages, and sometimes that of Aristotle. Bernard of Chartres, and William of Conches of the twelfth century were followers of Plato. The former[1] declared the world soul to be an entelechy which issued as if by emanation from the divine mind. This soul has given shape to nature. With Albert Magnus, Thomas Aquinas, Occam and Scotus of the thirteenth century a new era opens. Industrial and internal conditions of society were coming more into conformity with peace relations. The church was gradually losing its hold on society as a regulative force and signs of the Renaissance were being manifested.

Albert Magnus[2] thought "only that whose existence is self-derived has by its very nature eternal being; every creature is derived from nothing; and would therefore perish, if not upheld by the eternal essence of God. By virtue of its community with God, every human soul is an heir of immortality. The active intellect is a part of the soul, for in every man it is the form-giving principle, in which other individuals cannot share. This same thinking and form-giving principle bears in itself the forces, which Aristotle calls the vegetative, sensitive, appetitive, and motive faculties, and hence the latter are, like the former, capable of being separated from the body, and are immortal." The soul is the entelechy of the body, yet since certain of its functions are not connected with its organs, it is separate at these points, and at all points from the body. Man, in so far as he is man, is intellect; the highest stage of life is attained by knowledge, the participation in the divine. "With[3] the five senses and the *sensus communis* are said to be connected the *vis imaginative* and aestimativa, which are common to all animals; further, the *phantasia*, which at least the higher animals have; and finally the *memoria*." The *pars rationalis* of the soul is unchangeable, independent of matter, receptive; the intellect is the part of virtue of which man is immortal. This system so elaborately begun by Albert was completed in its different phases by Thomas Aquinas. The theological aspect was elaborately worked out by him. Both men are followers of Aristotle, the latter, it will be noted, sought to bring the teachings of Aristotle in closer *rapport* with the church.

For Thomas[4] the embryo, from the beginning of life, possesses a soul, but it is only a vegetative one. This soul disappears to make room for another; the second is both vegetative and sensitive, this yielding its place to a third, an intellectual soul, which includes the other two. It is a form without matter,

[1] Ueberweg: Hist. of Phil., Vol. I, p. 398.
[2] Ueberweg: Hist. of Phil., Vol. I, p. 398.
[3] Erdmann: Hist. of Phil., Vol. p. 406.
[4] Janet and Seailles: Hist. of the Problems of Phil., Vol. II, p. 195.

the entelechy of the body. The vegetable and sensitive souls are present in the embryo before the rational soul appears, this comes from without, is created immediately and fuses with the other two. All beings except God were created by God; the angels were the first and the noblest creatures and, like the angels, the souls of men are immortal forms. The rational soul has an existence apart from the body.

The vegetative and animal faculties depend only in their temporal activity on bodily organs. The intellect alone works without an organ, because the form of the organ would hinder the correct knowledge of other forms than himself. God and the active and passive human intellects are related to each other as are the sun, its light and the eye. The forms, which the passive intellect takes from the external world through the senses, are rendered really intelligible by the active intellect—there is no innate knowledge. The human soul does not have a pre-existence, but it does continue to live after death; is not destroyed by the dissolution of the body. Immortality belongs not merely to the thinking power, but also to the lower powers; the soul forms for itself after death a new body similar to its former one.

Thomas pointed out the distinction between the *anima sensitiva* and *anima intellectiva* in such a way as to harmonize the disputed points of Creativism and Traducianism. He regarded the *sensitiva* as a natural product while the *intellectiva* is a creation of God. The angels have the highest intelligences, the moving of the heavenly bodies is their first work. The *intellectus possibilis* is a part of the soul and is determined individually—it is the capacity of actively seizing the forms—and is immortal. The active understanding as well as the *intellectus possibilis* is a part of the soul and these two fill the whole body; if it were not so, man would not be responsible for his thoughts, which are the product of the *intellectus speculativus*, nor for his acts, which are products of the *intellectus practicus*. Memory does not survive death. The soul is an intelligence having form (substantial), and as such may survive the body. The existence of a soul in the bodiless form is contrary to its nature, so it becomes rehabilitated, the new body is called spiritual because it is subordinate to the soul; there may be bodily punishments after death.

With St. Thomas the philosophy of the Christian school, scholasticism, reaches its highest point. Weber[1] notes that scholasticism is first influenced by Platonism through the mediation of St. Augustine; from the thirteenth century on, it gradually suffers from the influence of Aristotle's philosophy.

[1] History of Philosophy, p. 202.

The latter period is further divided into one in which Aristotle is interpreted as a realist, and later as a nominalist. With the decline of scholasticism, theological discussion, as constituting the whole of philosophy, became less and less the dominant motive; the church no longer had a controlling influence. New interests and discoveries tended to dissipate thought, and offer new channels, aside from the purely theological view. These changes in the attitude of the people toward the church continued to grow with the development of scientific ideas, and on account of the fixed condition of affairs resulted finally in those disruptions of the church which have occurred from time to time since the mediæval period. Theological dogma established by the early fathers has changed little regarding the ideas of the soul, and St. Thomas, whose doctrines are still vital in the church, agrees very closely with Aristotle. Scholasticism practically came to a close with William of Occam; with the growth of science since that period, the views of life have constantly enlarged as discovery has progressed. New material and discovery have tended to limit the influence and work of the church and set it in its proper sphere. The doctrine of William of Occam may be summarized briefly as follows:

The [1]feeling soul (*anima sensitiva*) and the soul as form-giving principle (*forma corporis*), *i. e.*, the vegetable soul — of the body, are not identical with the thinking mind (*anima intellectiva*). The sensitive soul is extended, and is joined in a corporeal manner to the body, all parts of which it fills (circumscription), so that its parts dwell in separate parts of the same body. But the intellective soul is another substance, separable from the body and joined with it definitive, so that it is entirely present in every part. He argued for the separate substantial existence of the intellect, as founded on the antagonism between sense and reason.

A hasty glance at modern theological views will be taken, yet they do not reveal many new ideas. The Saracen view of the soul, as expressed by Al-Gazzali, is that "God has created the spirit of man out of a drop of his own light; its destiny is to return to him."

The question as to the origin of the soul has arisen from time to time. Another view in regard to this is: "As[2] life is given to the child in his mother's womb, so the angel pours the soul into him." — Friar Berthold. Sermon.

Luther expressed himself in favor of creationism. Later teachings of the Lutheran doctrine of the seventeenth century

[1] Ueberweg: Hist. of Phil., Vol. I, p. 464.
[2] Hagenbach: History of Doctrine, Vol. II, p. 241.

opposed the view. Modern teachers of the Protestant doctrine, *e. g.*, Göschel, recognized spirit and psyche, the latter being propagated by procreation, the former, by creation. Schöberlein regarded the soul as a natural product, but thought that the created spirit is absorbed into the soul of man, the two forming a union. Thus the soul becomes possessor of the spirit.

In regard to animal spirits and their relation to the soul: "These spirits are either the soul or an immediate instrument of the soul: this is certainly true; and their brightness surpasses the brightness of the sun and of all the stars. What is most wonderful is that in godly men the divine Spirit itself mingles with these same spirits, and with His divine light makes them still more bright, so that their knowledge of God may be yet more luminous, their attachment to Him more solid, and their aspirations toward Him more ardent. But if devils dwell in the heart, they blow upon the spirits, and bringing the heart and brain into confusion, interfere with judgment, give rise to open madness, and induce the heart and other members to commit the most cruel acts." — Melancthon.[1]

Relative of the soul to God and its nature: " . . . we are fashioned in the image of God in our minds or souls. . . . But what this image is we know not, excepting that the soul is the substance, upon which the image of God is specially impressed. And as we have never seen God in Himself, in His own form, we cannot know how our souls are like Him in substance and nature. And it comes at last to this, that the workings or powers of the soul, viz., will, understanding and memory, are nothing but signs of the essential image, which we shall really see when we see God as He is in Himself, and ourselves in Him." — Zwingli[2] Von der Klarheit des Wortes Gottes, I, 56.

St. Teresa uses language signifying some kind of animate substance and as though it were apart from the body: "The disquiet of the soul comes most frequently from bodily indisposition—for we are so wretched that this poor prisoner of a soul shares in the miseries of the body. The changes of the seasons and the alterations of the humors very often compel it, without any fault of its own, not to be what it would, but rather to suffer in every way,—some discretion must be used in order to understand whether ill-health be the occasion or not. The poor soul must not be stifled." — St. Teresa, Life, XI.

The spirit nature of man: man's spirit is his mind, which lives after death in complete human form. "Men are con-

[1] Lange: History of Materialism, Vol. I, p. 238.
[2] Hagenbach: History of Doctrine, Vol. III, p. 73.

stantly surrounded by spirits and angels of God who understand everything spiritually, because they are spiritual. After death, too, men are instructed by angels." — Swedenborg, Divine Revelation, I, p. 87.

The relation of body, soul and spirit: "The [1] soul is consequently, the sensitive organ, not the body, and is therefore the true and real body of the spirit, and the body is only its outward framework, its shell and covering." — Zschoke.

Soul and body: "Nature [2] is a living organism; there is an ideal in the real, a subject within the object, reason in matter. There is a soul in the world. All is pervaded by a law of polar forces." — Schelling.

Relation of God and man: The instances given below are taken from a number of more recent ideas, collected from the writings of different authors.

"The spirit is the spiritual nature of man as directed upward, and as capable of living intercourse with God. The soul is the spiritual nature as the quickening power of the body, as in animals; hence excitable through the senses, with faculties of perception and feeling." — Auberlen. Thompson's Dictionary of Phil., p. 36.

"The soul is the inferior part of our intellectual nature. The spirit is that part of our nature which tends to the purely rational, the lofty and divine." — Fleming. Vocab. of Philos., p. 474.

"Man was created psychical, but with the destination and means to become spiritual. The important point of his beginning lay in the soul, which unites his spirit-life and his corporeal life, by means of which, spirit and body stood in a reciprocal relation, whose aim was the glorification of the body." The life of the spirit was to make the soul — and by some means, the body the reflection of itself. "The soul, as little is the *doxa* of God, has an existence severed from its origin, and stiffened into passive, deliberate neutrality; the egress of the soul from the spirit is a continual process engaged in constant accomplishment, whose progress is only distinguished from the creative commencement by the fact that, after man is once created, both, without any temporal before and after, have an existence absolutely contemporary, and placed under a similar law of development." — Delitzsch: A System of Biblical Psychology.

"Our soul, [3] properly speaking, is not ours but we are its. It is not a part of us but we are a part of it. It is larger than

---

[1] Hemstreet: Mind is Matter (quoted), p. 37.
[2] *Ibid.*, p. 52.
[3] Ways of the Spirit, pp. 358-62.

we are, and older than we are, — that is than our conscious self. . . . It is not aboriginal, but a product, as it were the blossoming of an individuality. We may suppose countless souls which never bear this product, which never blossom into self. And the soul which does so blossom exists before the blossom unfolds." Whether a new soul is furnished to each new body, or whether the body is given to a pre-existing soul — psychology seems to favor the latter. "What we call 'I' is not the origin, but a product of the soul, a phase or mode of its present life. The soul was prior to its conscious self; it is the root or seed from which the conscious self has grown."— Hedge. The spirit[1] is the higher side of our incorporeal nature— the mind, as it is termed in scripture, when contemplated under its intellectual aspects, — the inner man, as it is also denoted, when viewed in its purely theological relations, in a word, the moving, ruling and animating principle of our natures. It is also the medium of our communication with, and the very temple of, the Holy Ghost. Thus the spirit may be regarded more as the realm of intellectual forces. . . . The soul is the lower side of our incorporeal nature, and the subject of the spirit's sway. It may be regarded more as the region of the feelings, affections, and impulses, of all that peculiarly individualizes and personifies. But it should be observed that scripture often represents the soul to us as almost necessarily involving and including the spirit. Thus the scripture never speaks of the salvation of the spirit, but the salvation of the soul."—Ellicott.

"It is [2] this trial of the soul which shows that one is never alone in the universe. It is the supreme evidence that there is a God, the one unquestionable assurance that God means something in all that we endure and suffer."

"If we are all ultimate manifestations of one Infinite Life, then in deepest truth, there is but one soul. . . . It is the consecrated person who has the greatest evidence that there is a soul . . . because he can thus transcend the limitations alike of feeling and thought, of time and space, is the ultimate reason for saying that man has, yes, that man is, a soul." — Dresser.

"I see [3] no scientific reason for doubting that disembodied spirits affect man both for good and for evil as men affect one another." — Dr. Lyman Abbott.

[4] "The individual existence of man begins on the sense plane of the physical world, but rises through successive gradations

---

[1] Destiny of the Creature, pp. 120-24.
[2] In Search of a Soul, pp. 76-87.
[3] Quoted by Hemstreet: The Substance of the Soul, pp. 180-84.
[4] In Tune with the Infinite, p. 29.

of ethereal and celestial spheres, corresponding with his ever-unfolding deific life and powers, to a destiny of unspeakable grandeur and glory. Within and above every physical planet is a corresponding ethereal organism, or soul-body, of which the physical is but the external counterpart and materialized expression. From this etherealized or soul-planet, which is the immediate home of our arisen humanity, there rises or deepens in infinite gradations, spheres within and above spheres, to celestial heights of spiritualized existence utterly inconceivable to the sense of man. Embodiment, accordingly, is two-fold, — the physical being but the temporary husk, so to speak, in and by which the real and permanent ethereal organism is individualized and perfected, somewhat as the full corn in the ear is reached by means of its husk, for which there is no further use. By means of the indestructible ethereal body and the corresponding ethereal spheres of environment with the social life and relations in the spheres, the individual and personal life is preserved forever." —Trine.

The ideas of soul, expressed in the teachings of Christian Science,[1] are to the effect that Mind, Soul, Spirit and God are alike in substance. "Soul or Mind is not seen by a corporeal sense, because it is spirit, which physical sight cannot discern. There is neither growth, maturity, nor decay in Soul. These errors are the mutations of sense, the varying clouds of mortal belief, which hide the Truth of Being."

"Science reveals Soul as God, untouched by sin and death, as the central Life and Intelligence, around which circle harmoniously all things in the systems of Mind."

"Spirit is the only Substance, the invisible and indivisible God. . . . There is but one Spirit, because there can be but one Infinite, and therefore but one God."

"Soul and Spirit are one. God is Soul. Therefore there can be but one Soul. Soul is not corporeal; neither does it belong to a limited mind or a limited body."

"The term souls, or spirits, is as improper as the term gods. Soul, or Spirit, signifies Deity, and nothing else."

"The immortality of Soul makes man immortal. If God, who is the Soul of man, were parted from His reflection, man, during that moment, etc. . . . Science reveals Spirit, Soul, as not in the body, and God as not in man, but as reflected by man."

"Human thought has adulterated the meaning of the word soul. . . . The proper use of the word soul can always be gained by substituting the word *God*, where the deific meaning is required. In other cases, use the word *sense* and you have

[1] Science and Health, pp. 206-235.

the Scientific signification. As used in Christian Science, Soul is properly the synonym of God, or Spirit; but out of Science soul is identical with sense."—Eddy.

"I gather this—that the spiritual body is real, is tangible, is visible, is human, —but that we shall be changed." — Eliz. Stuart Phelps: Gates Ajar.

"The spirit of the departed dead, I am convinced, have a certain influence over our minds." — Bishop Bowman.

"Radiant forces pass from us continually, as truly as light proceeds from the stars. A speaker reaches his audience by invisible ways that penetrate to the interior sense." — Denton.

"The mind is a spiritual substance, and there goes from it a sphere that surrounds it, and it is a radiant force like light or heat." — Evans.

The ideas presented in the latter part of this section are self-explanatory.

The opinions, either directly or indirectly expressed, of thirty-eight persons have been briefly presented. These give us, to some extent, a chronological view of various notions of the soul that have been held at different times by persons identified with the church, or those presenting the subject from a theological standpoint. The rules and laws of the church, as guides to certain beliefs or as forces compelling certain beliefs, must not be overlooked. In this respect we have a standard set up, — in one sense a school for education along certain lines, for those who are to become its members. The standards have changed from time to time, and have been revised by various church councils. Certain doctrines have been condemned at times; for instance, the Platonic idea of pre-existence was carried along through Neo-platonism, and came in contact with the doctrines of the church. Origen, among others, had taught it, but at the second council at Constantinople (553) Origen's teachings were condemned because they were thought to be too free and unsystematized, and with them the doctrine of pre-existence. This blow of the church was also aimed at Neo-platonism. The much disputed point of trans-substantiation, which was satisfactorily settled at the Synod of Vienna, has been a potent factor in volatilizing thought, *i. e.*, the bread and wine symbolized Christ's body; finally they came to represent life in Him.

Another factor[1] that has been potent in forming the idea of the soul is that of angels. Ideas suggested by their pictures and descriptions have had great influence in shaping ideas in regard to the soul. Justin Martyr regarded angels as personal beings who possess a permanent existence. He thought their

[1] Hagenback: Hist. of Doct., Vol. I, pp. 193-98.

bodies are analogous to those of men, and their food manna. Tatian thought their bodies ethereal and claimed that they could be perceived only by those in whom the spirit of God dwells and not by the natural or psychical man. Clement, in describing them, observed that they have neither ears, nor tongues, nor lips, nor entrails, nor organs of respiration, etc. Origen assigned to each a sphere of work.

In the Middle Ages[1] the science of spirits (souls) was called Pneumatology. It comprised the study of God, angels and man, the psychology of angels holding a place side by side with that of man.

During the later scholastic period[2] angels are distinguished from the souls of men as follows: (1) Physically, they have no actual need of a body. (2) Logically, they do not obtain knowledge by inferences. (3) Metaphysically, they do not think by means of images, but by immediate intuition. (4) Theologically, they do not become better or worse.

The nature of angels afforded much ground for debate. The ideas still prevalent are potent factors in moulding the lives of young people.

Much of the discussion concerning the soul during the past, as gathered from this study, has been without fact as a basis. A larger entity, nous, world-soul, spiritual existence, etc., is believed in; this, it is supposed by many, resides apart, has a personal relation to man, has furnished him a soul, presides over him in a personal manner. At death, if the soul is still in harmony with its creator, without sin, it returns thither. Early Christians thought that with the advent of Christ something had been done for them, that some objective help had been extended to them. This view still holds with some. The doctrine of immanence as a result of pantheism has tended to modify this view. In this Spinoza has been influential. Later thought, in many instances, recognizes the existence of a universal pervading spirit; soul is related to this from above; from below it has its corporeal relations with its fellow creatures. Most of the views presented belong to those who have been leaders at some time and do not represent the laity. Modern thought tends toward an ethical interpretation of the soul, this, perhaps, being the nearest approach to immaterial objectification that can be made.

THE SOUL WITH REFERENCE TO SYSTEMS OF PHILOSOPHY.

Strictly speaking there may be no purely philosophical conception of the soul apart from theology, or from psychological

[1] Janet & Seailles: History of the Problems of Philosophy, Vol. I, p. 27.

[2] Hagenback: History of Doctrine, Vol. II, p. 235.

analysis. This separation is merely arbitrary. Yet there is almost as much basis for it as there is for a line of distinction marking off theology, philosophy and psychology as independent departments of knowledge, none of which are sharply defined. The justification for such a study is as follows: first we have the idea of the soul as it is related to a personal God, this being the view held by the church. Besides this we have various discussions of an entified soul in different relations to an absolute being, — this may be a pantheistic view, or represent the soul's relation to a world soul, or a spiritual world, or some form of the Absolute. Then we have the idea of the soul as derived from a study of mental phenomena, — rather from empirical data; this falling under the head of psychology. The philosophy of the Christian Era was under the domination of the church. "Unity, servitude, freedom, — these are the three stages through which it has passed in its relation to ecclesiastical theology," says Ueberweg.[1] "The first movement in this direction consisted in a mere exchange of authorities, or in the reproduction of other ancient systems than that of Aristotle, without such modification and such adaptation to new and changed conditions, as the scholastics had effected in the system of Aristotle. Then followed the era of independent investigation in the realm of nature, and finally, also, in the realm of mind. . . . The second epoch of Empiricism and dogmatism was characterized by methodical investigations and comprehensive systems, which are based on the confident belief that the knowledge of natural and spiritual reality was independently attainable by means of experience or thought alone. Skepticism prepared the way for the third stadium in the history of modern philosophy, which was founded by criticism." Independent thought, free from the influence of the church and schools of scholasticism, — "two prisons of [2]knowledge," began to find expression during the fourteenth century. From this period to the close of the sixteenth the awakening took place, followed by the Reformation. The various causes that gave rise to those changes cannot be noted here, they were fundamental, the growth was natural. The church gradually lost its influence along several lines: it could no longer say what a man should think, nor was it able to suppress the expression of thought; it had no control over the discoveries and inventions of the times, it could not keep pace with them nor incorporate them into its system. With such an outline as is here presented our philosophical consideration of the soul will begin with the period of freedom of thought. Since during

[1] A History of Philos., Vol. II, p. 2.
[2] Fischer: A History of Mod. Phil., p. 80.

this period we have also the beginnings in a generalized way of modern psychology, though it is subordinate to philosophy, the problem becomes more complicated. The central point in the[1] study of both was the nature of the soul.

Free philosophical expression began with no one man in particular, but is the result of the utterances of many teachers and writers. These philosophical expressions mark the beginning of modern philosophy. Different writers have ascribed to different men the beginning of this epoch. Lewes begins with Bacon and Descartes, Falckenberg with Descartes, etc. Bacon was a philosopher and scientist combined. He excluded theology from his scheme; — he says, "If I[2] proceed to treat of it, I shall step out of the bark of human reason, and enter into the ship of the church; which is only able by the Divine Compass to rightly direct its course."

The sensible soul of man is material like that of animals. It consists of a fine fiery air which streams from the brain through the nerves and is nourished by the blood. Sensibility of impressions is characteristic of everything. The sensible soul is material, the spiritual soul is implanted by God; only religion can give instruction pertaining to the soul.

As is God so also is the spirit, which God has breathed into man, scientifically incognizable; only the physical soul, which is a thin, warm, material substance, is an object of scientific knowledge.

Bruno was the first metaphysician of the sixteenth century to accept the heliocentric system. For him[3] the elementary parts of all that exist are the minima or monads, which are spherical points both psychical and material. The soul is a monad. It is never entirely without a body. God is the supreme monad. He is the minimum, because all things are external to him, and the maximum since all things are in Him. He is present in things in like manner as being is present, or beauty in beautiful objects. God is the original and immanent cause of the universe. The stars are moved by the souls immanent in them. Matter and form are identical; matter contains in herself the forms of things. The beginnings of science greatly influenced the philosophical systems during this early period.

The awakening to a knowledge of natural forces and their application led to extreme materialistic views. Cause and effect was sought for, mechanics used; as a result we have Hobbes's application of the laws of mechanics to mental phenomena, and the mechanical theory of Descartes.

For Campanella the inner sense is a proof that sensation is

[1] Bowne: Metaphysics, p. 299-300.
[2] Lewes: Hist. of Phil., Vol. II, p. 116.
[3] Ueberweg: Hist. of Phil., Vol. II, p. 27.

true, *i. e.*, that the object really exists outside of the individual. Sense-perception derives its character of certitude from reason and reason transforms it into knowledge. The inner sense reveals to me my existence immediately as a being that exists, acts, knows, and wills. To exist means to proceed from a principle and to return to it. Power, wisdom and love are the 'primalities' of relative being, the sum of these is God. By mingling non-being in increasing measure with His pure being, the Deity produced in succession the ideas, angels, the immortal souls of men, space and the world of perishable things. All these existences have souls; nothing exists without sensation. When plants wilt they grieve, after a refreshing rain they experience pleasure. Sympathy and antipathy account for the free movements of all natural objects. "The soul is corporeal;[1] it is the warm, mobile, nervous spirit. Things work upon this spirit, thereby assimilating it to themselves." The change that this produces remains in the spirit like a scar. It strives after its principle, not like most things after finite principles, but infinite. It attains immortality by virtue of its striving. As a philosopher Descartes with his "thought" as the essence of the mind or soul, later followed by Spinoza with the belief that the soul is the "idea" of the body, these in their wider sense no doubt are philosophical doctrines; but as analytical studies of soul they are considered under the section on psychology.

Gassendi revived the atomistic conception of the universe. The universe is a co-ordinate whole, the elements of which are atoms. These are determinations of an indestructible principle, which is matter. The appearance and disappearance of things is only the reunion and separation of atoms. He thought that atoms[2] possess feeling, they are created by God. An all-pervading world-soul is thus assumed. He attempted to unite spiritualistic ideas with atomistic and mechanic doctrines. The soul moves the body in so far only as it is itself material. There is a natural soul, vegetative-sensitiven (Lebens princip) and a rational, immaterial, immortal soul. These are connected. There are no innate ideas; all knowledge begins with the senses, they yield us immediate cognition of things; phantasy reproduces our ideas and understanding compares them. "Phantasia" is the counterpart of sense, it has to do with material images, it is material, and the same in both men and brutes. The intellect is immaterial and immortal; it attains notions and truths of which no effort of sensation or imagina-

[1] Pünger: A Hist. of the Christ. Phil. of Relig., p. 102.

[2] Carus: Lehrbuch der Psychologie, p. 193.

tion can give us the slightest apprehension: as the notion of God, for example. The final end of life is happiness, harmony of soul and body.

Leibnitz is one of the foremost among the philosophers belonging to this early period. Descartes recognized no extension in the soul, this was directly contradicted by Leibnitz's theory of monads. Our inner experience[1] reveals to us an active real force, which is the only force we know; this is our soul. Metaphysical atoms must be conceived of after the image of our soul. Everything in the world is force, soul, life, thought, desire; we see only the outside of Being, Being is that which itself sees. Perception explains the unity, likewise the diversity of the monads. The monad is a created thing and subject to change, its nature is perception. The effort made by a monad to pass from one internal state to another is appetition. The primitive monad is God; those which are thinking beings, like human souls, are capable of clear and distinct ideas; they are also conscious of themselves and of God. The souls of animals have sensation and memory.

"The merely living thing is the monad joined to an appropriate body. Its perception is unconscious and both perish together. *Omne corpus mens est momentanea.* The second degree is that of the monad endowed with more distinct perception, *i. e.*, with feeling; such a monad may be called a soul; when united to its proper body it is an animal. The third degree is that of the soul endowed with reason and reflection, or minds (spirits). The spirits are characterized by knowledge, properly so-called, by self-knowledge, by the possession of universal truths, and consequently the possibility of demonstrative knowledge." All the monads of the human body are independent, yet they harmonize with the monad soul. That which appears to us as a body is in reality an aggregation of many monads. Everything in nature is organized. There are no bodies without souls, also no souls without bodies. Plants and minerals are, as it were, sleeping monads with unconscious ideas. Every organism is a complex of them. In plants ideas are formative vital forces. The greater distinctness of its ideas distinguish the dominant monad, it is more active and more perfect, it reflects clearly while the body monads reflect but obscurely. The monads of the body are the first and direct object of the soul. The soul and the body of man agree, like two clocks originally set together and moving at exactly the same rate. When soul and body were first created, independent harmonious law was established. The soul following the law of association of ideas may have a painful sensation at the

[1] Leibnitz, by Theodore Merz, p. 177 *seq.*

same time that the body receives a wound. A desire arises in the soul and by the law of mechanics at the same instant the arm is extended.

"The more we think of it," says Bowen, "the more that doctrine of Leibnitz,[1] which appears so wild and fanciful at first, that every monad has in it from its first creation an infinite number of confused unconscious perceptions; and that these, in the successive stages of its being, are slowly evolved from each other in regular order, and so rise into consciousness, not through any contact or impulse from things without, though such contact or impulse furnishes the *occasion* on which they rise, but only through the monad's or soul's own internal law of development — the more, I say, this doctrine appears plausible and credible."

Voltaire presents quite a different view. The optimism of Leibnitz finds no place for him.[2] From the facts of astronomy he came to the conclusion that the teachings of the church were untrue. He may be taken as a representative of the scepticism of the French enlightenment; he emphasizes more strongly than Locke the possibility of the supposition that matter may think; and will not believe that there dwells within the brain an unextended substance, like a little God. He is inclined to regard the substantial soul as an "*abstraction réalisée*," like the ancient goddess Memoria, or such as a personification of the blood-forming force would be. All our ideas arise from the senses. "No one," says Voltaire, "will ever make me believe that I am always thinking, and I am no more disposed than Locke to imagine that several weeks after my conception I was a very learned soul, knowing then a thousand things which I forgot at my birth." He admits that certain ideas — moral, especially, although not necessarily innate, arise perforce from the constitution of human nature. He believes that the existence of God is demonstrable. The Deity and immortality are postulates of the moral feeling.

Voltaire, for example, expresses nothing positive. He is rather a representative of a reactionary movement of thought against church doctrine. The doctrine of innate ideas has been a burning question at times. The Innate Idea seems to carry with it something of the pre-existent, in fact it has been held in the past as a necessary support to religious teachings. Beginning with Plato, the theory did not meet with great opposition until the time of Locke.

The three ideas of innateness[3] are, (1) the idea is given us at our first creation, bearing no relation to the other faculties;

[1] Modern Philosophy, p. 45.
[2] Ueberweg: Hist. of Phil., Vol. II, p. 124.
[3] Fleming: Vocab. of Phil., p. 26.

(2) it is given us as a form, either of thought generally or of some particular species of thought, and is embodied in our mental powers; (3) the idea is interwoven in the original constitution of some mental power. The first view is that regarded by the church. Whether man came into existence with a trace from the past, or with a soul partly preformed, was a vital question, and since the time of Locke we find first one view predominant and then the other advocated, according as some one school or another came into prominence. In recent times the question is wrapped up in that of heredity.

Berkeley recognized only spirits and their functions; the existence of the material world is not only undemonstrable, but false. Abstract matter is a phrase without meaning; individual things are collections of ideas in us; if we take away all sense-qualities from a thing nothing remains. Ideas are the only objects of knowledge, nothing exists except minds and their ideas. His theory of mind is that ideas are of three sources.[1]

1. "Ideas actually imprinted on the senses.

2. "Ideas arrived at by attending to the passions and operations of the mind, as pleasure, pain, etc.

3. "Ideas formed by memory or imagination reviving and combining the two other classes." Besides these three kinds of ideas there is something that knows or perceives them and exercises the functions of willing, imagining, remembering. "This is mind, spirit, soul, myself, but it is something different from the ideas that constitute knowledge. All things that compose the frame of the world — subsist either in the mind of created spirits or in the mind of some eternal spirit. There is no other substance but spirit.

"Sense[2] and experience acquaint us with the course and analogy of appearances or natural effects. Thought, reason, intellect, introduce us into the knowledge of their causes." Sense implies an impression from some other being, and denotes a dependence in the soul which hath it. Sense is a passion; and passions imply imperfection. God knoweth all things as pure mind or intellect; but nothing of sense, nor in, nor through a sensory. As men rise from the life of sense toward the reason that is found to shine in and through sense, they approach that union with God — the chief end of man. Each lower faculty in us is a step that leads to one above it, — the uppermost brings us to God, who is Reason. Ideas are not innate but the rational constitution of things is innate in that intellect which we share with God. The existence of matter is

[1] Bain: Mental Science, p. 203.
[2] Fraser's Berkeley, pp. 203-206.

not directly known, the existence of spirit is known directly. This is the only existence. The natural or created ideas which God impresses on us are copies of the eternal ideas which he himself perceives through his creative reason. Thus, following Berkeley's views, we do not arrive at any definition of soul, but mind or spirit is the only real existence, God exists as a spirit, and man's nature partakes of this spirit life.

Reid, the founder of the Scottish school, propounded a system of philosophy in which appeal was made to common sense — this in order to avoid the scepticism of Hume.

"I take[1] it for granted that all the thoughts that I am conscious of or remember, are the thoughts of one and the same thinking principle, which I call *myself* or *my mind*." "Every action or operation therefore supposes an agent; every quality supposes a subject. . . . We do not give the name of mind to thought, reason, or desire, but to that being which thinks, which reasons, which desires." "My personal identity implies the continued existence of that indivisible thing which I call myself. To what purpose is it for philosophy to decide against common sense. The belief in a material world is older and of more authority than the principles of authority." To judge of first principles requires no more than a sound mind free from prejudice, and a distinct conception of the question. Those things really persist that we distinctly perceive by our senses, and are what we perceive them to be. The qualities that are perceived by the senses must have a subject (*i. e.*, the body), the thoughts we are conscious of must have a subject (*i. e.*, the mind). The distinction between sensible qualities and the substance to which they belong is found in the structure of all languages. Nothing is more absurd than that there should be extension without anything extended, motion without anything moved. Every sensation is the sign of the presence of an object. The reality of the subject is guaranteed by thinking. What the understanding recognizes clearly and distinctly is necessarily so. We perceive because God has given us the power of perceiving. The sphere of consciousness cannot be transcended. Reid's view, as the common sense one, identifies the mind or soul with that which thinks, reasons and desires; one's personal identity implies the continued existence of an indivisible self.

Lessing is regarded by some as a follower of Leibnitz. For Lessing the Deity is the "supreme, all-comprehensive living unity, without life and action and the experience of changing states. Things are not out of God but in him, yet distinct. God's thinking is creation, his ideas actuality. Every individ-

[1] On the Intellectual Powers of Man, Vol. I, chap. xi.

ual is an isolated divine perfection. Things in the world are all living, all have souls and of a spiritual nature, though in different degrees, in fact they are limited gods. Development is everywhere. The soul now has five senses but probably it once had less than five and in the future will have more. God creates only simple beings, there exists a harmony among these that explains all the world processes. With different degrees of perfection these beings possess different degrees of the consciousness of this perfection and act accordingly. All created things are simple percipient beings. God is the highest and most perfect monad. Harmony binds the world and all that is in it together. Soul[1] is a simple being which is capable of infinite perceptions; as a finite being it is not capable of this at once but gradually in an infinite succession of time. Thus it becomes developed, but it implies a future life. We may receive more senses in that life, a new organization, as we develop, that we may receive more ideas. The material world is animated, particles serving the soul in any one sense constitute homogeneous combinations of matter; there may be as many senses as there are such possible combinations; there are more than five of these. The individual soul has already been several times in different bodies and shall continue to develop through similar transmigrations in the future.

According to histories of philosophy this might be the place in a series of briefs like these to mention Kant, and in fact classic philosophy would almost consider it a sacrilege to omit some treatment of his ideas. Perhaps this is the place, yet this study pretends to be historical only in the sense of getting a general picture, and mention is made elsewhere of his ideas. He examined critically the rational and empirical views that have been held by the different schools, pointed out inconsistencies, and, as far as possible, attempted to harmonize them. In place of the antitheses which Kant had set up between the categories as rules of the understanding and principles of the reason, Fichte regarded these as strata; that is, the reason apprehends in a purer form what it has accomplished in a lower stage. Fichte thus develops one part of the Kantian system more completely, — instead of the transcendental being closed we develop into it. Philosophy is "the systematic development of the idea of the Ego."[2] The non-Ego is a postulate of our reason, — this is, at the time, unconsciously made, it is a product of the Ego. The Ego alone remains when the unknown (substance) is abolished. The Ego creates this. Starting from the existence of mind or ego, Fichte developed his

[1] Pünjer: Hist of the Christ. Phil. of Relig., p. 568.
[2] Adamson's Fichte, pp. 163-188.

system. The absolute Ego is known by an intellectual intuition. The first and lowest stage of the Ego is one of passivity, it is not reflectively aware of the activity involved in itself, but rather a state of sensation. The second stage is reached when it is aware of the activity in itself, of sensation; when it reflects on these, and opposes to itself something foreign, this is the stage of intuition. By reflection on intuition an image of that which is considered constructed, this image is distinguished from a real thing to which the image corresponds, forms the third stage. A fourth is understanding through which the concept is gained; the fifth and highest stage of the consciousness is reflection upon judgment, in this abstraction is made of all save the Ego itself, which is pure abstraction.

The only reality is the spiritual, matter as non-Ego is postulated, the mind makes all that it knows. The absolute Ego, the universal soul, whose essence is activity, sets opposite to itself an illusory world. Fichte's notions of philosophy were modified in later years, the idea of a personal God was criticised. In his later works God is the moral order of the world. The life of consciousness, the manifestation of God, breaks itself up into an endless multiplicity of individual forms; these, as independent, self-existing facts, are the mode of one infinite life.

"The substance[1] is the totality of its accidents, nothing more is embraced in it than the accidents; analyze the substance, and nothing is reached but accidents. An enduring substance, or, if you please, a bearer of accidents, is not to be thought of; one accident supports another. . . . The soul is no more than nature; it is a phenomenon of the internal sense. But we must frame a better notion of nature than that it is a dead material thing; we must think of it as spiritual. Nature is a formal image of the absolute, and its supreme point is man." Soul becomes the active principle, creating nature.

Fichte's system of idealism is followed by Schelling, and this again by Hegel. For Fichte[2] it is the "I" that exists, for Schelling the "I" and the object are both real, for Hegel the only thing really existing is the idea. In order to explain the development of nature from the lowest to the highest formations, Schelling assumes the existence of a soul of the world as an organizing principle. The perfect theory of nature would resolve all nature into intelligence. Dead and unconscious products of nature are abortive attempts to reflect itself, it is immature intelligences which shines through all her phenomena. All individual intelligence may be regarded as integral parts of God, or of the moral order of the world. Matter is extinct

[1] J. G. Fichte: Werke, Vol. II, p. 562 *seq.*
[2] Lewes: Hist. of Phil., Vol. II, p. 595.

mind. The eternal Son of God is the finite as it exists in the eternal intuition of God. This Finite appears as a suffering God, — subject to the fatalities of time. History mirrors the world-spirit as an eternal poem of the divine understanding. Nature is the embryonic life of spirit, they are essentially identical. The real and the ideal, the objective and the subjective are, so to speak, two poles of the Absolute. This world-soul embracing subject and object is apprehended by us in our deepest intellectual intuitions. The plurality of souls is the development of the Absolute.

"My Ego[1] is only so far, and can be thought of only so far as it thinks itself." It brings itself forth by its thinking, — by absolute causality.

"The Ego or human spirit abstracted from its powers and acts is nothing. The soul is not something existing in itself, and which could consequently exist, if it neither felt, nor thought, nor willed."

"The soul, as it exists by relative antithesis to the body, consequently not in itself, appears only by this antithesis as determined to existence. It is on the one side, one with the body, and on the other, it is the infinite cognizing. To the soul so far as it is finite, we must ascribe all the relations which are of necessity ascribed to the body. In its infinite cognizing, the infinite thinking has become objective; on this being, at once subjective and objective, infinite and finite, rests the Ego. It is the unity of the subjective and objective." There is no such thing as body opposed to soul. We give the name of spirit to the power which, in its being exterior to itself, still abides with itself.

Hegel represents another type of idealism. The attempts of idealists to define God and the soul and to establish a relationship between them have been the chief factors reducing these elements to unknowable or unthinkable terms. For Hegel[2] all things come from the Absolute, which is the idea. Spirit is developed, by the logical process, from dependence on nature to freedom, this is its essence. The steps of progress are the subjective spirit depending on nature and on the body, this is manifest in the study of anthropology; the objective spirit seen in the products of the will: customs, laws, etc.; and the absolute spirit which appears in art, religion, and philosophy. Reality is the common source of the Ego and nature, they are immanent in it. Mind and nature are the successive modes of God, and the union of nature and idea is in spirit, is in God. The soul is not present at any one point, but everywhere at

[1] Fleming: Vocab. of Phil., Fichte, Werke Vol. I, p. 96; II, 193-95.
[2] Ueberweg: Hist. of Phil., Vol. II, p. 233.

millions of points. "The principle[1] stages of subjective spirit are natural spirit, or soul, consciousness, and spirit as such." The momenta of the Idea are life, cognition, and the absolute Idea; the Absolute Idea is the pure form of the conception. Nature is the idea in the form of otherness. "The death of mere immediate, particular life is the birth of the spirit." Psychology considers spirit as intelligence, will, and ethicality.

The divine and the human are one, man's spirit is identical with the infinite intelligence. "We must say of everything which exists, that it exists and is maintained by an eternal act of knowledge on the part of the Absolute; and the spirit of man, being itself the Absolute, has the faculty of reproducing freely, through speculative thought, this eternal act of knowledge."

"The pure[2] reference to myself—the reflection in which I no longer refer myself to some other, but refer myself to myself, or an object to myself—this is the Ego, the web of the infinite being itself. It is the complete abstraction from all that is finite. The Ego as such has no contents given by nature or immediate, but has only itself as contents, as it is only by means of abstraction from every other. This pure form is at the same time its contents." The body is the same life as the soul, and yet they may be spoken of as lying asunder. A soul without body would be nothing living, and the converse is true. The existence of the notion is its body; the body obeys the soul which has brought it forth. The germs have the true in them, and embrace its total force, though they are not yet the true itself." "The soul generates the unity of the body and is its permeating vital force." This indicates very briefly the pantheistic view of Hegel. Yet for as complete system as he has given it can be but a very brief account.

Briefly passing over some of the more recent ideas we note the following: For Hamilton, "Subject denotes the mind itself, mind and matter as known and knowable are only two different series of phenomena or qualities; as unknown and unknowable they are the two substances in which these two different series of phenomena or qualities are supposed to inhere. The existence of an unknown substance is an inference we are compelled to make from the existence of known phenomena. God is an object of faith, not knowledge, "a God understood would be no God at all." Through experience and reason we are naturally inspired with a kind of suggestion and belief in being, transcending what we actually experience. Experience, especially of mind, is the ground for deciding alternatives in

[1] Caird's Hegel, p. 183.
[2] Werke XVIII, 21 and 93; VIII, 22, 23. Fleming's Vocab.

theology. On the ground of experience and what we find in consciousness only can we have any convictions regarding the nature of mind, the world, and of God. The substance of the mind and the world are incognizable *per se*, but relatively knowable through special qualities and manifestations. Mind is known primarily as Ego or self in its unity amid successive stages. By analogy from our experience we reach a noumenal entity called God, related on the side of time and space to the things therein, on the side of mind to the Ego and the contents of consciousness. These relations give us an imperfect knowledge of God. There is no need for a doctrine of omnipresent creation, the grand order of the cosmos may have been constituted in one great act. "Consciousness[1] is simple — is not composed of parts, either similar or dissimilar. It always resembles itself, differing only in the degree of its intensity: thus there are not various kinds of consciousness, although there are various kinds of mental modes or states of which we are conscious."

For Schopenhauer.[2] The unconscious will which constitutes the reality of things existent, is first and original. The intellect is physically conditioned, depending on the functioning of a material organ. It is dependent upon this organ and without it is just as impossible as the grasp without the hand; it belongs to the phenomenon. Will is bound to no special organ, is everywhere present, that which moves and forms, and conditions the whole organism,—the metaphysical substratum of all phenomena. Death teaches man that his true nature which is will, will henceforth live in other individuals, while his intellect continues to exist in the condition of being idea, *i. e.*, in the objective being of things.

"It is purely impossible for us to be conscious of ourselves, independently of the objects of knowing and willing. When we enter into ourselves, and begin to reflect on ourselves, we lose ourselves in a fathomless emptiness, in a darkness in which all cognition ceases, and we grasp nothing but an insubstantial spectre, the Ego itself remains after it all a riddle."

For Fechner: The soul of man partakes of the larger consciousness animating the world. The earth-soul looks through the eyes of all men. As our body is occupied throughout by our soul, so the world-soul or God occupies the universe.

"The phenomena[3] of body and soul hang together as internal and external phenomena of the same essence. This primary essence is, however, nothing more than the conjunction of phe-

---

[1] Hamilton's Metaphysics, LXI.
[2] The World as Will and Idea, Vol. III, pp. 3 and 306; I, 327.
[3] Physical and Philosophical "Atomlehre," pp, 258-59.

nomena themselves in the unity of a general consciousness. The soul becomes aware only of its own proper phenomena, the body becomes aware only through that which appears of it to the soul itself. It is a common essence which appears externally as body, internally as soul."

"The entire[1] spiritual life is rooted in this corporeal soil, and uses the bodily organism as its instrument. The spirit has no independent agency; it acts only through and in the body. It can manifest itself only by means of its necessary instrument, the body. Hence every disturbance of the body will produce, by reaction, a corresponding disturbance in the mode in which the mind is accustomed to manifest itself." — Luthardt.

For Spencer:[2] "Mind as known to the possessor of it, is a circumscribed aggregate of activities; and the cohesion of these activities, one with another, throughout the aggregate, compels the postulation of a something of which they are the activities. But the same experiences which make him aware of this coherent aggregate of mental activities, simultaneously make him aware of activities that are not included in it. . . . These external activities must forever remain to him nothing more than the unknown correlatives of their effects on the aggregate." Mind and matter are alike unknown.

"Once more we are brought round to the conclusion repeatedly reached by other routes, that behind all manifestions, inner and outer, there is a Power manifested. Here, as before, it has become clear that while the nature of this Power cannot be known — while we lack the faculty of framing even the dimmest conception of it, yet its universal presence is the absolute without which there can be no relative facts. Every feeling and thought being but transitory — an entire life made up of such feelings and thoughts being also but transitory — nay, the objects amid which life is passed, though less transitory, being severally in course of losing their individualities, quickly or slowly: we may learn that the one thing permanent is the Unknowable Reality hidden under all these changing shapes."[3]

"In the organism formed of atoms, which are spiritual essences, one unfolds its spiritual force to the point of self-consciousness; this atom, which as gasiform atom interpenetrates the entire organism, and occupies space as a centre, is the soul. It is invisible, but a local and not unphysical essence. The mass of the brain is an organized state of living essences, which are directed by one of their own number in the midst as a choir of music by their leader." — Drossbach. Harmonie der Ergebnisse der Naturforschung.

[1] Fundamental Truths, p. 125.
[2] Prin. of Psychology, Vol. I, pp. 159-160.
[3] Principles of Psychol., Vol. II, p. 503.

"The [1] chief evidence of the soul's spirituality will be found to be, when inspected, intuition. . . . All the attributes of matter are absolutely irrelevant to spirit and to all of its modifications." . . . Ideas are impressed in it. "It is a substance that is simple monadic, indivisible, unextended and devoid of sensible attributes."—Dabney.

"The reality [2] of the soul consists in its ability to act; other reality it has none. How the soul can act there is no telling. In thinking of the soul we must not look for a lump, nor for a category, nor for a picture, but for the agent which thinks and feels and wills, and knows itself in so doing. And this soul is neither in the heights nor in the depths; it is very nigh indeed, for it is simply the living self."

"The self-identification of the soul, then, is the best proof of identity, for identity has no other meaning." —Bowne.

As a constant [3] there is no immaterial soul substance; the existence of the soul consists in soul-life, —when one analyzes the psychic processes no residue remains. The soul-atom as substance is a survival of metaphysics.

The atom is the absolute constant of the material world, and as to quantity and quality unchangeable. All change is traced back to the arrangement and motion of the atom. If one carries this idea over to psychic life then one destroys the concept or the life. The soul is not unchangeable and constant like the atom, but constant transformation is its characteristic and as the atom may, the soul never returns to a former condition. So you cannot speak of the soul as substance in the sense of being atomic.—Paulsen.

"Man's soul [4] is a description of reality *sub specie aeterim;* it is an image of God. God enters, as it were, in parts with every sense-impression into sentient creatures, and his likeness grows in clearness as the traces thus produced in living feelings reconstruct the World-Logos, which in man's soul appears as the divine spark called Reason." —Carus.

We have now given a very incomplete résumé of ideas of the soul that may be classified as philosophical, they should be regarded, in some measure, as representative rather than a complete list. Certain lines of thought have been influential as determining the attitude philosophers have taken, as, for example, the standpoint of empiricism followed generally by English writers, and until recent years the domination of idealism in Germany. The point of departure is, to a large extent, the factor determining the significance a philosopher will at-

[1] Sensual Philosophy of the 19th Century, p. 142.
[2] Metaphysics, pp. 339 and 344.
[3] Einleitung in die Philosophie.
[4] The Surd of Metaphysics, p. 60.

tach as to the meaning of mind or soul. He has before him the problem to explain certain sets of facts, and to establish harmony among them. The most important of these facts are as follows: given the belief in an immortal part of the body, mind or soul, and the belief in a supreme being to establish a relationship that will be consistent with the universe as a whole. The kind of explanation depends upon the facts supposed to be known of each. Thus the philosophical conception of the soul presupposes a larger view of things than that of either theology or psychology alone.

The influence of the beginnings of science can be noted in the explanations given of mind at that time and the reactions to the church in such conceptions as are presented by Voltaire. Taking its impetus from Leibnitz the dynamic view of life, *i. e.*, as a development of some form, found favor with philosophers before Darwin presented his biological evidences in favor of it; the soul finding its perfection in God. Its spiritual nature is thus recognized by Lessing, Schelling, Hegel, and other idealists, similar in essence to the Absolute Being. For Schopenhauer it takes the form of will. Later writers have not contributed much. The philosophical conception, as based on the development of animal life has, perhaps, not yet been fully worked out.

From the developed sciences there will always be a search for laws and general principles; thus as new sciences are evolved there will continually be new elements of knowledge contributed toward what is considered the Absolute. These new elements will likewise be contributions to our knowledge of soul. The term soul is one too large for any one science, each contributes its part toward our knowledge of it.

[Continuation follows in the next number.]

"GENERAL INTELLIGENCE," OBJECTIVELY DETERMINED AND MEASURED.

By C. SPEARMAN.

TABLE OF CONTENTS.

		PAGE
Chap. I.	Introductory.	
	1. Signs of Weakness in Experimental Psychology	202
	2. The Cause of this Weakness	203
	3. The Identities of Science	204
	4. Scope of the Present Experiments	205
Chap. II.	Historical and Critical	
	1. History of Previous Researches	206
	2. Conclusions to be drawn from these Previous Researches	219
	3. Criticism of Prevalent Working Methods	222
Chap. III.	Preliminary Investigation	
	1. Obviation of the Four Faults Quoted	225
	2. Definition of the Correspondence Sought	226
	3. Irrelevancies from Practice	227
	(a) Pitch	228
	(b) Sight	232
	(c) Weight	233
	(d) Intelligence	233
	4. Irrelevancies from Age	233
	5. Irrelevancies from Sex	235
	6. The Elimination of these Irrelevancies	236
	7. Alternations and Equivocalities	238
Chap. IV.	Description of the Present Experiments	
	1. Choice of Laboratory Psychics	241
	2. Instruments	242
	(a) Sound	243
	(b) Light	244
	(c) Weight	245
	3. Modes of Procedure	246
	(a) Experimental Series I	246
	(b) " " II	247
	(c) " " III	248
	(d) " " IV	249
	(e) " " V	249
	4. The Estimation of Intelligence	249
	5. Procedure in Deducing Results	252
	(a) Method of Correlation	252
	(b) Elimination of Observational Errors	253
	(c) Elimination of Irrelevant Factors	255
Chap. V.	The Present Results	
	1. Method and Meaning of Demonstration	256
	2. Correspondence between the Discrimination and the Intelligence	259

PAGE

(a) Experimental Series I 259
(b) " " II 263
(c) " " III 264
(d) " " IV 265
(e) Conclusions 268
3. Correspondence between General Discrimination and General Intelligence 268
(a) Village School 269
(b) The High Class School 269
(c) Practical Verification of the Argument 271
(d) Conclusion 272
4. Universal Unity of the Intellective Function 272
5. The Hierarchy of the Intelligences 274
6. Outer Factors Determining the Amount of Correlation 277
7. Previous Researches Conflicting with the Present Results 279
8. Summary of Conclusions 283
Appendix. Tabular Statements of Original Data and Calculated Correlations 286

CHAPTER I.

INTRODUCTORY.

1. *Signs of Weakness in Experimental Psychology.*

To-day, it is difficult to realize that only as recently as 1879 Wundt first obtained from the authorities of Leipsic University one little room for the then novel purpose of a "psychological laboratory."

In twenty-four years, not only has this modest beginning expanded into a suite of apartments admirably equipped with elaborate apparatus and thronged with students from the most distant quarters of the globe, but all over Germany and in almost every other civilized country have sprung up a host of similar institutions, each endeavoring to outbid the rest in perfection. The brief space of time has sufficed for Experimental Psychology to become a firmly established science, everywhere drawing to itself the most vigorous energies and keenest intellects.

But in spite of such a brilliant career, strangely enough this new branch of investigation still meets with resolute, wide spread, and even increasing opposition. Nor are its enemies at all confined to belated conservatives or crotchety reactionaries; they are rather to be found among the most youthful schools of thought; their strength may be in some measure estimated from the very elaborate apology which one of the best known experimental psychologists has lately found himself called upon to utter on behalf of his profession.[1]

[1] Münsterberg: "Die Grundzüge der Psychologie."

And, indeed, when we without bias consider the whole actual fruit so far gathered from this science—which at the outset seemed to promise an almost unlimited harvest—we can scarcely avoid a feeling of great disappointment. Take for an example Education. This is the line of practical inquiry that more than all others has absorbed the energy and talent of the younger workers and that appears to offer a peculiarly favorable field for such methods. Yet at this moment, notwithstanding all the laborious experiments and profuse literature on the subject, few competent and unprejudiced judges will venture to assert that much unequivocal information of capital importance has hitherto thus come to light. Nor have the results been more tangible in Psychiatry or in any other department of applied psychology.

Those, then, who have the highest opinion concerning the potentialities of this new science, will feel most bound to critically examine it for any points of structural incompleteness.

2. *The Cause of this Weakness.*

Most of those hostile to Experimental Psychology are in the habit of reproaching its methods with insignificance, and even with triviality. They regard it as an infatuation to pass life in measuring the exact average time required to press a button or in ascertaining the precise distance apart where two simultaneous pinpricks cannot any more be distinguished from one another; they protest that such means can never shed any real light upon the human soul, unlock the eternal antinomy of Free Will, or reveal the inward nature of Time and Space.

Such blame, however, would appear ill founded—at any rate, in principle. This same apparent triviality lies at the base of every successful science. The three laws of Newton on first inspection are by no means remarkably significant; yet by a large number of instructed persons they have been found implicitly to contain the supreme key to every event on the earth below and in the heavens above. When starting any new branch of mathematics, again, most people have had occasion to be astonished at the curious suddenness with which the seemingly shallow beginnings have shelved down into drowning deep water. The general fact is that our limited intellects can only hope to deal with the infinite complexity of Nature after analyzing it down into its bare unæsthetic elements.

On the other hand, it must frankly be admitted that such a procedure is, after all, only indirect; that it does not immediately handle the things which really interest us, but other things which are believed to accurately enough betoken the former; that the results arrived at concerning the simpler terms are therefore always worthless, except in proportion as their

elements have been proved beyond dispute to be identical with those of the more complex terms. Now, even in physical sciences this proof is not such an infallible operation that we can afford to neglect the possibility of lurking errors which may vitiate all our conclusions; and in psychical research such dangers are enormously magnified. When we pass an electric current through water until it vaporizes away into bubbles of hydrogen and oxygen, we can with reasonable precautions be tolerably certain that we have still got in our jars almost the whole of the same material substance, only reduced to simpler forms. But when we assert that the decision of Regulus to vote against making peace with Carthage was no more than a conglomeration of visual, auditory, and tactual sensations in various stages of intensity and association, then there is an undeniable risk that some precious psychical elements may have slipped through our fingers.

On this vital matter, it must reluctantly be confessed that most of Wundt's disciples have failed to carry forward the work in at all the positive spirit of their master. For while the simpler psychoses of the Laboratory have been investigated with great zeal and success, their identification with the more complex psychoses of Life has still continued to be almost exclusively ascertained by the older method of introspection. This pouring of new wine into old bottles has not been to the benefit of either, but rather has created a yawning gulf between the Science and the Reality. The results of all good experimental work will live, but as yet most of them are like hieroglyphics awaiting their deciphering Rosetta stone.

3. *The "Identities" of Science.*

Here, we naturally arrive at the important question as to what actually constitutes "identity" for scientific purposes.

As regards the material atoms of the physical sciences, this relation is of two orders. There is the Identity in the looser use of the word, which really means no more than uniformity of potential function, or the fact of having like reactions under like conditions; this alone constitutes the proper topic of the science. And then there is the true Identity involved in the metaphysical idea of persistence of substance, which in science is only a convenient working hypothesis to aid in establishing uniformities of the former order.

For psychology, also, the identification is of two orders. First, there is once more Uniformity of Function, and again this appears to be the proper topic of the positive science. But the second order is quite disparate from anything in physics, being that of inward resemblance as ascertained by introspection; such a "Conceptual Uniformity," though in metaphysics per-

haps of primary importance, in psychology is but an indispensable substructure—and one of lamentable fallibility. It cannot even be forthwith assumed necessarily to imply complete Functional Uniformity; and it is peculiarly insusceptible of scientific precision, propositions scarcely ever admitting of either decisive confirmation or refutation.

Now, it is one of the great merits of experimental psychology to have largely introduced the direct investigation of these Functional Uniformities, which have the infinite advantage of being eventually susceptible of conclusive proof, and on being securely established are in their turn capable of throwing back a valuable corrective light upon the Conceptual ones also. So far, however, this matter of research seems to have been almost entirely confined to such correspondences as are approximately complete (these, indeed, being the only ones attainable without a new development of methodics). But the vast majority of the functional relations are not thus complete; they are more or less thwarted by other factors; they outwardly present themselves only in the form of stronger or weaker *tendencies*. And precisely of this incomplete nature are most of the Functional Uniformities which connect the psychics of the Laboratory with those of real Life.

4. *Scope of the Present Experiments.*

The present article, therefore, advocates a "Correlational Psychology," for the purpose of positively determining all psychical tendencies, and in particular those which connect together the so-called "mental tests" with psychical activities of greater generality and interest. These will usually belong to that important class of tendencies produced by community of organism, whereby sufficiently similar acts are almost always performed by any one person in much the same manner; if, for example, he once proves good at discriminating two musical tones, he may be expected to manifest this talent on any subsequent occasion, and even in another portion of the scale.

For finding out the classes and limits of these individual functions, modern psychology seems to have mainly contented itself with borrowing statements from the discredited "faculties" of the older school, and then correcting and expanding such data by inward illumination. The following work is an attempt at the more fatiguing procedure of eliciting verifiable facts; the good intention and the difficulty of such an enterprise may, perhaps, be allowed to palliate the shortcomings in its execution. Our particular topic will be that cardinal function which we can provisionally term "General Intelligence;" first, there will be an inquiry into its exact relation to the Sensory Discrimination of which we hear so much in

laboratory work; and then—by the aid of information thus coming to light—it is hoped to determine this Intelligence in a definite objective manner, and to discover means of precisely measuring it. Should this ambitious programme be achieved even in small degree, Experimental Psychology would thereby appear to be supplied with the missing link in its theoretical justification, and at the same time to have produced a practical fruit of almost illimitable promise.

CHAPTER II.

Historical and Critical.

1. *History of Previous Researches.*

Though, as above stated, mental correlation has in general met with great neglect, yet a certain number of psychologists, including several of the best known, have from time to time turned their attention that way also. It therefore seems advisable, before entering into the present work, first briefly to survey the results of these previous researches; they will be found on the whole to indicate some very remarkable conclusions.

Only those correspondences will be taken into account in which both terms compared are of a psychical nature; many investigators, after determining the chief measurements of their subject's mind, proceed to make their record still more complete by also noting his most prominent bodily characteristics and external relations, such as his height and weight, the shape of his head, the color of his eyes and hair, the birthplace of his mother, etc. Such considerations, however interesting, do not quite fall within the scope of the present inquiry.

Galton. The first hint appears to have come from that suggestive writer, Francis Galton. As early as 1883, the latter stated that he had found men of marked ability to possess on the whole an unusually fine discrimination of minute differences in weight.[1] The pregnancy of this idea is unmistakable. But Galton appears to have been diverted from the point by other interests, and to have contented himself with the above general impression, without clinching the matter in systematic investigation. In 1890, however, on Cattell publishing an article about "Mental Tests and Measurements,"[2] a remark was appended by Galton suggesting the desirability of comparing such laboratory values with "an independent estimate of the man's powers. . . . The sort I would suggest is some-

[1] "Inquiries into the Human Faculty." [2] Mind, 1890, p. 380.

thing of this kind,—'mobile, eager, energetic; well shaped; successful at games requiring good eye and hand; sensitive; good at music and drawing.'" It will be seen that subsequent investigators have unanimously preferred a much less lively programme.

Oehrn. The earliest actual experiments in mental correlation seem to have been those of Oehrn,[1] in 1889, which at the same time furnished the starting point for that special branch termed by him, and now popular as, "Individual Psychology." The latter must, however, be fundamentally distinguished from the "Correlational Psychology" here advocated. For the former deliberately bases itself upon introspectively determined faculties and upon mental tests; whereas the latter *begins* by empirically ascertaining both the faculties and the precise value of the tests. The former endeavors to discover those small deviations from general law which constitute "individuality;"[2] while the latter, on the contrary, proposes methodically to eliminate individualities as an obstacle to further progress, being itself, no less than General Psychology, in search of laws and uniformities.

Oehrn tested ten subjects in Perception ("Wahrnehmungsvorgang"),[3] Memory, Association, and Motor Functions. In accordance with his standpoint of a priori assumed faculties, he does not correlate the results with any independent estimate of his subjects' intellectual powers, but only the tests with one another. He eventually comes to the conclusion that Perception, Memory, and the Motor Functions are "proportional to one another," but that Association is rather inverse to all the others!

Boas. The comparison desired by Galton between these laboratory tests and on the other hand the psychics of practical life was, as far as I am aware, first undertaken seriously by Boas. In 1891, the latter examined no less than 1,500 school children as to their Sight, Hearing, and Memory; and then—following the example of the semi-anthropometrical correlations of Porter and others—he proceeded to compare their performances in the above respects with their "Intellectual Acuteness" (as estimated by their teachers). On the first two heads, un-

[1] "Experimentelle Studien zur Individual-Psychologie," Dorpater Dissertation, 1889.

[2] Oehrn and Krapelin propose to study "the fine deviations from the great fundamental features of psychical conformity to law;" or again, "to determine the essential differences between minds."

[3] Even the term "individual" does not seem very happy, since it chiefly awakens the impression of dealing with individuals as contrasted with masses. In this latter and much more appropriate sense, Wundt uses "Individual Psychology" in opposition to his "Folk Psychology" (Grundriss der Psychologie, p. 28).

fortunately, the results have never been published. But as regards Memory, wherein his method of procedure in the main resembled that of Oehrn, the facts elicited were elaborated by Bolton,[1] who comes to the following conclusions:

"The Memory Span increases with Age rather than with the growth of Intelligence."

"The Memory Span measures the power of concentrated and prolonged Attention."

"Intellectual Acuteness, while more often connected with concentrated Attention, does not require it, and it cannot be said that those pupils who are bright intellectually are more distinguished on account of their good memories."[2]

It will be observed that these results are in sharp antagonism with the view of many modern psychologists, notably Wundt, who would make Attention the very essence of intellectual power.

Gilbert. In 1893, at New Haven, another series of experiments was carried out upon an almost equally extensive scale, and is still among the most important contributions to the subject. J. Gilbert applied several mental tests to about 1,200 children of both sexes, and then compared the results with their "general ability" (again as estimated by their respective schoolmasters).[3]

On this occasion, the original assertion of Galton was to some extent practically corroborated. For Gilbert believes himself to find a real correspondence of Intelligence with Sensory Discrimination both of weights and of shades. He also, like Bolton, discovers a slight correspondence with Memory; in Gilbert's experiments the child, instead of learning by heart a row of figures, had to give his judgment as to when a musical tone had lasted just as long as a previously sounded standard one.

But the correspondence deemed most positive and conspicuous was that between Intelligence and "Reaction-time." This is particularly suggestive, on reflecting how especially this Reaction-time depends upon concentration of the Attention. The indication would therefore accord rather with Wundt's view than with that of Boas. Curiously enough, when the Reaction-time is made more obviously intellectual by further complications (Discrimination and Choice), then the above correspondence becomes reduced in amount.

Scripture. In the same little volume, appears an account of an interesting experiment by Scripture, as to the correspondence

---

[1] *Am. Jour. of Psych.*, Vol. IV, p. 362.
[2] *Am. Jour. of Psych.*, Vol. IV, pp. 379, 365, and 366.
[3] Stud. Yale Psych. Lab., Vol. II, p. 40.

between shortness of Reaction-time and swiftness in lunging with foils. Unfortunately, his subjects are only seven in number. He feels himself, however, "fully justified" in coming to the conclusion that "the average fencer is not quicker in simple reaction than a trained scientist, and neither class shows an excessive rapidity."[1]

The first part of the above sentence would well harmonize with the intellectuality found also by Gilbert to be connected with speed in pressing a button; but the latter part is difficult to reconcile therewith, at any rate without painfully lowering the credit of "trained scientists."

Dresslar. Also in 1893, a quite new kind of correlational factor is investigated, that of natural illusions. As is well known, if we pick up two things of the same weight but of different size, we are almost irresistibly inclined to estimate the larger one as being the lighter of the two; strangely enough, the illusion still persists even after we know that the weights are really equal. Some 173 boys and girls were tested in this respect by Dresslar, and at the same time were classed by their teachers into "bright," "good," and "dull."[2] Dresslar found that the phenomenon was perfectly constant throughout the ages tested, 7 to 14 years, and that instead of the fallacy chiefly affecting the stupid children, as might have been expected, it on the contrary showed itself the more powerful in proportion as the child was "brighter;" hence he concluded: "The more intelligent the children, other things being equal, the stronger are the associations between the ideas of size and weight."

Griffing. In the following year, H. Griffing examined the other chief aspects of Attention.[3] The two former workers had dealt with its concentration or *in*tensity; Griffing now inquires about its amplitude or *ex*tensity. He does this by the well-known method of "tachistoscopy:" a number of syllables are exposed to view for a very brief moment, and the subject has to try how many he can read in this practically simultaneous manner.

The result of two independent sets of such experiments is in both cases that "the brighter students tend to excel."

Bourdon. About now we come upon a new and significant phenomenon in the course of these researches. The latter, though originally prompted in England, had forthwith been transplanted to America, in which country alone up to the present date they had been cultivated so as to bear fruit. But at

[1] Stud. Yale Psych. Lab., Vol. II, p. 122.
[2] *Amer. Jour. Psych.*, Vol. VI, p. 343.
[3] *Amer. Jour. Psych.*, Vol. VII, p. 227.

length the Old World also woke to the necessity of answering the questions. France led the van, soon bestowing upon the problem an original and characteristic impress.

In August, 1895, appeared an article by Bourdon entitled "Recognition, Discrimination, and Association."[1] For this investigation, about a dozen subjects were tested in

(1) the power of recognizing words previously shown to them;

(2) the power of quickly and accurately erasing from a printed page certain given letters of the alphabet (this was one of Oehrn's tests for "den Wahrnehmungsvorgang");

(3) the number of ideas arising in the mind within one minute on a given suggestion.

The conclusion arrived at[2] is that all three faculties present some correspondence with one another, but that this is much most marked between Recognition and Association.

Thus upon this occasion, as in the work of Oehrn, the mental tests were only compared with one another, and not with any independently obtained estimate of Ability. Like the German, Bourdon appears to consider that these three faculties, Recognition, Discrimination, and Association, are so satisfactorily represented by the tests,[3] that any otherwise gained values of Intelligence would merely be vaguer and less trustworthy versions of the same data.[4]

Binet and Henri. Again in France, towards the end of the year, there appeared an important article of similar tendency, bearing the well-known signatures of Binet and Henri[5] and setting forth the urgent need of "studying the relations that exist between different psychical processes." They propose the following ten tests: Memory, Mental Images, Imagination, Attention, Faculty of Comprehending, Suggestibility, Æsthetic Sentiment, Moral Sentiments, Muscular Force and Force of Will, Cleverness and "Coup d'oeil." By these means, they hope to measure off "a personality" in a fairly exhaustive manner within 1 to 1½ hours.

In the tests themselves, there is a new feature to be noticed. Hitherto, these had been of the most elementary and unequivocal nature possible, as befits the rigor of scientific work. But

---

[1] Revue philosophique, Vol. XL, p. 153.

[2] Based only upon nine of the subjects, for some had not undergone all three tests.

[3] Same article, p. 185.

[4] "La méthode à laquelle j'ai eu recours pour étudier ce phénomène (de la Reconnaissance) . . . pourrait servir a déterminer assez promptement et avec une rigeur satisfaisante quelle est l'aptitude d'une personne à reconnaître." And similarly for the other two faculties.

[5] L'année psychologique, Vol. II, p. 411.

this very simplicity had much increased the difficulty of making the test truly representative of any more complex psychosis. Binet and Henri appear now to seek tests of a more intermediate character, sacrificing much of the elementariness, but gaining greatly in approximation to the events of ordinary life. The result would seem likely to have more practical than theoretical value.

Next year Binet begins to put his interesting programme into execution.[1] He examines about 80 children and 6 adults as to powers of describing a picture shown to them, and by this means discovers the existence of five fundamental types of character, the "describer," "the observer," "the erudite," "the emotional," and "the idealist." "It is perhaps the first result," Binet remarks, "that has hitherto been produced by the experimental study of the higher intellectual faculties."

Binet then compares these new types with "the notes and comments which the professors wrote about their pupils and which the Director of the school has carefully checked." But as to the result of this comparison, unfortunately, only the following brief remark is made public: "Of five pupils whom I had put into the 'emotional' group, four had a cold temperament, a dry nature, and a little sensitiveness; the fourth alone seemed sensitive."

Sharp and Titchener. The above work of Binet and Henri found a speedy re-echo from the other side of the Atlantic. Some experiments with the avowed object of examining this new class of test are now recorded as taking place at Cornell University under the direction of Dr. Sharp and with the aid of Prof. Titchener.[2] These were expressly intended to depart from the older "German procedure" of dealing solely with the "elementary mental processes," and instead were to subject to trial the "French procedure" of directly handling the "complex" ones.

The following classification was adopted: Memory, Mental Images, Imagination, Attention, Observation, Discrimination, and Taste. The subjects consisted of three male and four female advanced students. No independent information was obtained concerning the subjects' respective mental powers, it being only attempted to ascertain whether the tests were consistent among themselves.

The results are not very encouraging:

"The lack of correspondences in the individual differences observed in the various tests was quite as noticeable as their presence."

---

[1] L'année psychologique, Vol. III, p. 296.
[2] *American Jour. Psych.*, Vol. X, p. 348.

"But little result for morphological psychology can be obtained from studies of the nature of the above investigation."

"In the present investigation the positive results have been wholly incommensurate with the labor required for the devising of tests and evaluation of results."

In conclusion, Sharp suggests the advisability of judiciously combining the characteristics of both the French and German procedures with one another.

Wagner. Almost simultaneously, the idea of collating mental tests with more practical methods of appraisement begins to take root in Germany also. In 1896, a series of experiments for the purpose of inquiring into the question of fatigue of school children was carried out at Darmstadt under the direction of Dr. Wagner.[1] The children were from the new Gymnasium there and seem to have amounted in all to 44 (though the information on this point is not very definite.) The test investigated was the old one of Weber which had recently again been brought to the notice of pedagogical circles by Griesbach. As is well known, it consists in ascertaining how near together two points can still be distinguished from one another by touch. On this occasion, care was taken to obtain an estimate of every child's Natural Talent (Begabung), Industry, Attentiveness, Nervousness, and sometimes Temperament.

Unfortunately for our present purpose, the intention of the experiment was not so much to correlate these psychical qualities with the children's absolute sensitivity, as with the reduction in such sensitivity produced by the fatigue of lessons. This reduction is stated to correspond closely with the amount of Attention paid by the child, but to be almost independent of his Natural Talent. Once more, therefore, Attention and Ability are contrasted instead of being identified.

As far as concerns the children's unfatigued condition, our real present topic, we only learn that the nervous and indisposed have a less fine tactual sensitivity than the others.

Ebbinghaus. About the same time, another and much more extensive investigation was officially instituted in Silesia for the same purpose. Two entire upper schools, a boys' Gymnasium and a girls' High School, were before and after work subjected to three tests: the two old ones of Oehrn for Memory and Association (memorizing and adding numbers respectively), and the new "Combination Method"[2] of Ebbinghaus. The latter observer in discussing the results devotes no less than one entire section out of four to considering the rela-

[1] Sammlung von Abhandlungen a. d. Gebiete der päd. Psych., Vol. I.

[2] In this, a purposely defective text is given to the subject, and the latter has conjecturally to fill in the missing parts.

tions shown between these tests and the children's general intellect.[1]

He comes to the conclusion that the school order shows an appreciable correspondence with all three tests, but least so with Memory and most with his own new Combination Method. He particularly points out that in the last mentioned this correspondence applies, not only to difference of class, but also to position within each class; whereas in the case of Memory, he thinks that if anything the least intelligent succeed the best!

The Combination Method would appear to resemble the new type of test recommended by Binet and Henri, to the extent of presenting a rather intermediate character between the elementariness of normal laboratory work and the complexity of practical activities.

Wiersma. To depart for a moment from the chronological to the logical order of events, this favorable verdict of Ebbinghaus concerning his own new method was in 1902 strongly corroborated by some experiments of Wiersma.[2] This time, three schools were brought into service. Two of them were special training establishments for male and female teachers respectively, from fourteen to nineteen years old. The third was a "Nachbildungs" School, namely, one for those of both sexes who had already gone through the six classes of the elementary school; they consequently aged from eleven to fourteen. The total number came to about three hundred.

Following closely in the steps of Ebbinghaus himself, Wiersma finds his average results to improve regularly with the higher classes and with the higher sections of each class. He takes great pains to analyze the factors upon which such school position depends, and arrives at distinguishing Age, Educational Development (Entwickelung), and Natural Talent (Begabung). In many complicated tables and graphs, he marshals evidence that the observed correspondence is most of all due to the last named factor.

Binet and Vaschide. In 1897, the question is again attacked by Binet, now in partnership with Vaschide.[3] But there is a remarkable return, as far as psychics are concerned, to the old less aspiring forms of tests. For he once more examines children in Reaction-time, Reaction-time with Choice, and Memory of Numbers. In addition thereto, he devises the ingenious test of motor ability called Dots ("petits points"); this consists in seeing how often the subject can tap with a pen on a piece of paper in 5 seconds. The intellectual order of the

[1] Zeitschrift für Psychologie und Physiologie, Vol. XIII, p. 401.
[2] Zeitschrift für Psychologie und Physiologie, Vol. XXX, p. 196.
[3] L'année psychologique, Vol. IV.

children was again obtained from their respective ranks in class. The subjects numbered 45 and averaged about 12 years of age. The results are exactly opposite to those of Gilbert, for Binet sums up as follows:

"The Intellectual Order harmonizes badly with Reaction-times and harmonizes well with the Memory of Numbers." But better than either appears the correspondence with his own "Dots."

This work was quickly followed by similar tests upon older subjects. For such purpose, Binet and Vaschide turned to the Normal School of Teachers at Versailles and there examined 43 youths ranging from 16 to 20 years of age.[1] This time, the scanty positive results of the former experiments are still further reduced; for even the correlation with Memory is somewhat less in evidence. The relation with the "Dots" again presents an unbroken regularity, but this time it seems to have become *inverse*, the stupidest tapping with the greatest speed!

Seashore. We next come upon an interesting series of carefully conducted experiments, to which we shall frequently have occasion to refer. It took place from 1897 to 1899 at the University of Iowa, under the direction of Dr. Seashore, the subjects being nearly 200 children varying from 6 to 15 years inclusive.[2]

Here, the negatory note that we have first heard from Binet is reiterated, and now in much fuller tones. As regards General Intelligence (again as estimated by the teachers) and Memory of Time, between which Gilbert had found a very marked correspondence, Seashore on the contrary disposes of the question in the following brief words: "There appears to be no functional relation between the two processes."

So, too, between Intelligence and Discrimination of Pitch. For while Gilbert believed himself to have discovered some such correlation, Seashore again says curtly: "There is no functional relation; the distribution of the results practically coincides with the most probable distribution according to chance."

He further compares General Intelligence with the faculty of discriminating Loudness and with various Illusions of Form, Color and Weight. In each case, he finds himself forced to the same conclusion, that there is no indication of the bright children doing differently from the dull ones.

Pearce. Again temporarily deserting the chronological order, some other illusional experiments were carried out in 1903 by H. Pearce.[3] These dealt with the subjective localization of

---

[1] L'année psychologique, Vol. IV. [2] Stud. Psych. Iowa, Vol. II.
[3] Archiv für die gesammte Psychologie, Vol. I, Part 1.

touch sensations and indicated that judgment tends to be warped by other immediately preceding touch sensations in the same neighborhood of the skin. Pearce tested 32 children in this way and came to the conclusion that the warp is directly proportional to the child's intelligence. While thus corroborating Dresslar rather than Seashore, he differs even from the former in that he declares the fallacy to diminish continually with increase of age.

Bagley. The negations of Binet and Seashore were soon carried to a still further extreme. W. Bagley, experimenting at Madison upon 160 children,[1] corroborates Binet to the effect that Reaction-time shows no correspondence with School Intelligence, and also supports the latter's second and inverse rather than first and direct result with "Dots;" for Bagley not only denies all correspondence between any motor abilities and mental ones, but believes his work to demonstrate positively that there is even a marked antagonism between the two, so that excellence in either direction is apt to be accompanied by deficiency in the other.[2]

Carman. In 1899, at Saginaw, there was another investigation which, if we are to go by the number of children tested, must be judged the most important that has taken place up to this day.[3] A. Carman examined 1,507 of them as to their sensibility to pain (and also their strength of hand), noting in each case, as had now become usual, whether the teacher pronounced them to be "bright," "average," or "dull." Not much detail is given, but the following general conclusions are arrived at:

"Boys reported by their teachers as bright were more sensitive than those reported as dull."

"Girls reported as bright were more sensitive and stronger than those reported as dull."

"Those reported as being especially dull in mathematics were more sensitive on the right temple than on the left."

It is further discovered that

"Girls with light hair and blue or gray eyes are less sensitive to pain on left temple," but "on right temple they are more sensitive than the dark."

This information is very curious.

Kirkpatrick. In 1900, a slight rally against the emphatic denials of Binet, Seashore, and Bagley is attempted by E. Kirkpatrick.[4] About 500 children were tested in three "sim-

[1] *Am. Jour. of Psych.*, Vol. XII, p. 193.

[2] The relation between motor and mental ability appears to have also been treated by Handcock, Peckham, and Porter, but I have not been able to obtain access to their works.

[3] *Am. Jour. of Psych.*, Vol. X, p. 392.

[4] Psych. Review, Vol. VII, p. 274.

ple motor activities," including Binet's Dots, Counting Aloud, and Sorting Cards; their respective performances were then compared with their degrees of intelligence as estimated in the usual way by their teachers.

The result is in every case a decided correspondence.

Thorndike and Woodworth. Hitherto, we have only seen attempts to ascertain what I may, perhaps, be allowed to call "statical correlation." But in 1901, Messrs. Thorndike and Woodworth make a vigorous onslaught upon the still more important and difficult "dynamical correlation." It is useful enough to know whether any child that "taps," etc. with unusual slowness may thereupon straightway be considered as "dull;" but it would be even more to the point to learn that daily practice with the tapping machine could make him any brighter.

Various previous researches had been distinctly encouraging in this matter. Stumpf declares: "The power of mental concentration upon certain points, in whatever region acquired, will show itself effectual in all others also."[1] Gilbert and Fracker had found that practice in one form of discrimination or reaction-time brought with it improvement in the other forms.[2] Scripture writes, intending apparently to include intellective activities: "Development of will power in connection with any activity is accompanied by a development of will power as a whole."[3] And again, Davis comes to the conclusion that "practice in any special act" develops ability "for all other acts."[4]

The experiments of Thorndike and Woodworth, however, give once more a flat negation. The indications are rather that the effect of training in any one mental achievement is of little or no use for other intellectual performances, even very closely akin. The persons tested were carefully exercised until they had acquired considerable proficiency in judging the relative sizes of some pieces of paper of a particular shape. But this so obtained talent seemed completely to depart as soon as new tests were made with papers of a different shape, or even of a somewhat different size. Similar experiments in other sorts of feats led to the same result.

Binet. About the same time, we have another interesting and long contribution from Binet.[5] His subjects numbered eleven and were specially selected as being the five cleverest and the six most stupid out of a class of thirty-two. These

[1] Tonpsychologie, 1883, Part I, p. 83.
[2] Univ. Iowa Stud. Psych., Vol. I.
[3] Psych. Rev., Vol. VI, p. 165.
[4] Stud. Yale Psych. Lab., Vol. VI.
[5] L'année psych., Vol. VI, p. 248.

two groups, the "intelligent" and the "unintelligent," were in all the tests opposed and compared.

Binet again confirms, and more positively than ever, that Reaction-time, either with or without the complication of "Choice," has no correspondence with Intelligence. He also contradicts the correlation found by Griffing with the *ex*tensive dimension of Attention, in the form of simultaneously reading a large number of letters exposed to view for a small fraction of a second; though, curiously enough, Binet finds a certain amount of correspondence when he quite similarly exposes some arabesque designs. And finally, he finds no correlation with a new test of his own devising, namely: a trial how small a change in the rate of the beats of a metronome can be accurately detected.

But, on the other hand, his formerly successful method of Memory of Numbers now once more showed a marked correspondence with Intelligence. So also, and to a similar amount, is a correlation shown by Erasure of Letters (like that of Oehrn and Bourdon) and by Arithmetical Addition (more complicated than that of Ebbinghaus). So, again, do his new tests of Accuracy in Counting Metronome Taps and in Counting Dots. And so does his other new test, that of Copying: the subject is to copy a certain amount of writing, and then note is taken as to how many syllables he writes from each glance at the original; the more intelligent, the more words per glance.

But the fullest correspondence of all was presented by the very old test of Tactile Discrimination, which we have already seen successfully assayed by Wagner in 1896.

Binet is further strongly of opinion that all these correlations with Intelligence are most marked upon first trial, and that they continually diminish in proportion as the intelligent and unintelligent are both alike given more and more practice in the tests.

Simon. Directly inspired, apparently, by the last research, the correspondence there discovered between intelligence and the Copying test was now corroborated under new conditions. M. Simon conceived the idea that any such correlation should be manifested in especially prominent relief at the Vaucluse colony for backward children. He therefore tries seventeen of them, and finds in fact that, with one exception, all those classed medically as "Idiot" or "Imbécile" can copy fewer syllables at a time than do those merely termed "Dégénéré" or "Débile."[1] He concludes enthusiastically as follows:

"Convenient, short, and exact, this copying of phrases at once constitutes a good method of diagnosing a child's intellectual development at the very moment of the experiment."

[1] L'année psych., Vol. VII, p. 490.

independent of one another except for this common word to designate them, or else our scientific "tests" would appear to have been all so unhappily invented as to lie outside the widest limits of those very faculties of which they are supposed to form a concentrated essence.

It is true that Functional Uniformities might conceivably exist of other kinds; but for any such there is even less evidence; nor would they appear at all a priori probable, in view of the complete and surprising absence of that important one constituted by community of organism. Failing all Functional Uniformities, any connection between the experimental procedure and practical intelligence can then be no more than "Conceptual." But this is a position scarcely tenable for those whose chief claim is finally to have escaped from the endless tangle of purely introspective argument; moreover, such an admission would shear every experimental research of almost its whole worth and deprive the systems built thereon of their essential base.

Further, if thus the only correspondences hitherto positively tested, those between Intelligence and its variously supposed Quintessences, have totally failed to reveal any real existence, what shall we say of all the other by no means so apparently self-evident correspondences postulated throughout experimental psychology and forming its present backbone? To take one of the most extensive and painstaking of them, Dr. Schuyten, from 1893 to 1897, continuously amassed evidence to prove a close relation of the middle European temperature with the faculty of "voluntary attention" and even more generally with "the intensity of cerebral activity;" he seems to have repeated his observations on about five hundred different days, upon each occasion indefatigably proceeding round Antwerp from one school to another, visiting most of the time as many as eight. Now, his actual test of "voluntary attention" and "cerebral activity" consisted entirely in noting how many children kept their eyes on their lesson books for five consecutive minutes; but, as far as I am aware, there has not yet been any positive proof that this posture sufficiently coincides with all the other activities coming under this general term of "voluntary attention;" and in view of the universal breakdown of evidence for much more plausible correlations, Schuyten's a priori assumption can hardly be admitted as an adequate basis for his wide reaching theoretical and practical conclusions. To try another example, we have seen that a favorite test, successively adopted by Oehrn, Bourdon, and Binet,[1] is that of erasing from a printed page certain given letters of the alpha-

[1] The last named seems to have been the first to inquire into, rather than assume, the range of function involved in this test.

bet; but sceptics are still able to contend that because any person can dash a stroke through a's and i's with unusual speed, he need not therefore be summarily assumed to possess an abnormally large capacity for discrimination generally speaking, say, for telling a fresh from an over-night deer's trail, or distinguishing sound financial investments from unsound. Precisely similar criticism may be extended to almost the whole mass of laborious attempts to establish practical applications of Experimental Psychology, whether for pedagogical, medical, or other purposes.

Nor is the case much otherwise even with those stricter and more theoretical researchers who are rather inclined to regard as superficial any experiments involving large numbers of subjects. For however modest and precise may seem the conduct of their own actual investigation, it nearly always terminates with and justifies itself by a number of sweeping conclusions; and these latter will be found to essentially imply some assumed general function or process, such as "memory," "association," "attention," "fatigue," "practice," "will," etc., and at the same time that this function is adequately represented by the laboratory test. To take for instance the speed of mental association, there is hardly a psychologist of note who has not at some time or other made wide reaching assertions on this point, often indeed finding herein one of the pillar stones of his philosophy; the more practically minded, as Kraepelin and his school, content themselves with demonstrating the details of its actual conduct, showing us how the rate will rise with practice or on imbibing tea, how it sinks in proportion to fatigue or mental disorder, how under the influence of alcohol it for a brief moment slightly ascends and then becomes permanently and profoundly depressed. But all these conclusions are derived from observation of one or two supposed typical forms of this "association;" while the extensive experiments of Aiken, Thorndike, and Hubbell reveal that every form of association, however closely similar on introspection, must, nevertheless, always be considered separately on its own merits, and that "quickness of association as an ability determining the speed of all one's associations is a myth." [1] The most curious part of the general failure to find any correspondence between the psychics of the Laboratory and those of Life is that experimental psychologists on the whole do not seem in any way disturbed by it. But sooner than impute to them—the avowed champions of positive evidence—such a logical crime as to prefer their own a priori convictions to this mass of testifying facts, it is perhaps pardonable to suspect that many of them do not realize the full significance of the situation!

[1] Psych. Rev., Vol. IX, p. 375.

3. *Criticism of Prevalent Working Methods.*

There is, however, an intermediate way between ignoring all this serious testimony and submissively accepting it; this consists in subjecting it to the most searching criticism of which one is capable. But such a procedure quickly leads to questions of greater generality; if we would deal with the matter at all adequately, we are compelled to enter into a general discussion of the methods universally prevalent for demonstrating association between two events or attributes. To this important topic a special work has been devoted.[1] For the present, we must limit ourselves to the following brief exposition of the chief deficiencies appearing especially to characterize the long series of experiments just reviewed.

In the first place, only one out of them all (Wissler at Columbia) attains to the first fundamental requisite of correlation, namely, a *precise quantitative expression*. Many writers, indeed, have been at great trouble and have compiled elaborate numerical tables, even bewilderingly so; but nowhere do we find this mass of data focused to a single exact result. In consequence, not only has comparison always been impossible between one experiment and another, but the experimenters themselves have proved quite unable to correctly estimate even their own results; some have conceived their work to prove that correspondence was absent when it really existed to a very considerable amount; whereas others have held up as a large correlation what in reality is insignificantly small. Later on, we shall come upon examples of both kinds of bias. With this requisite is closely bound up another one no less fundamental, namely, that the ultimate result should not be presented in some form specially devised to demonstrate the compiler's theory, but rather should be a perfectly impartial representation of the *whole* of the relations elicited by the experiments.

Next, with the same exception as before, not one has calculated the "probable error;" hence, they have had no means whatever of judging how much of their results was merely due to *accidental coincidence*. This applies not only to the experiments executed with comparatively few subjects, but even to those upon the most extensive scales recorded. The danger of being misled by combinations due to pure chance does, indeed, depend greatly upon the number of cases observed, but in still larger degree upon the manner in which the data are calculated and presented.

Thirdly, in no case has there been any clear explicit definition of the problem to be resolved. A correspondence is ordi-

[1] "The Proof and Measurement of Association between two Things." *Am. Jour. Psych.*, XV., 72.

narily expressed in such a general way as neither admits of practical ascertainment nor even possesses any great theoretical significance; for a scientific investigation to be either possible or desirable, we must needs restrict it by a large number of qualifications. Having done so, any influence included (or excluded) in contravention of our definition must be considered as an *irrelevant and falsifying factor*. Now, in many of the experiments that we have been discussing, even in those upon quite a small scale, the authors have tried to kill as many birds as possible with one stone and have sought after the greatest—instead of the least—diversity; they have purposely thrown together subjects of all sorts and ages, and thus have gone out of their way to invite fallacious elements into their work. But in any case, even with the best of intentions, these irrelevant factors could not possibly be adequately obviated, until some method had been discovered for *exactly measuring* them and their effect upon the correlation; this, to the best of my knowledge, has never been done. As will presently be seen, the disturbance is frequently sufficient to so entirely transform the apparent correlation, that the latter becomes little or no evidence as to the quantity or even direction of the real correspondence.

Lastly, no investigator seems to have taken into any consideration another very large source of fallacy and one that is inevitably present in every work, namely, the *errors of observation*. For having executed our experiment and calculated the correlation, we must then remember that the latter does not represent the mathematical relation between the two sets of real objects compared, but only between the two sets of measurements which we have derived from the former by more or less fallible processes. The result actually obtained in any laboratory test must necessarily have in every case been perturbed by various contingencies which have nothing to do with the subject's real general capacity; a simple proof is the fact that the repetition of an experiment will always produce a value somewhat different from before. The same is no less true as regards more practical appraisements, for the lad confidently pronounced by his teacher to be "dull" may eventually turn out to have quite the average share of brains. These unavoidable discrepancies have always been ignored, apparently on some tacit assumption that they will act impartially, half of them tending to enhance the apparent correlation and half to reduce it; in this way, it is supposed, the result must in the long run become more and more nearly true. Such is, however, not at all the case; these errors of observation do not tend to wholly compensate one another, but only partially so; every time, they leave a certain balance *against the correlation*, which

is in no way affected by the number of cases assembled, but solely by the size of the mean error of observation. The amount of consequent falsification is in physical inquiry often unimportant, but in psychology it is usually large enough to completely vitiate the conclusion. This falsifying influence has in many of the above experiments, especially the more extensive ones, occurred in exaggerated form; for even those experimenters who are most careful in the ordinary routine of the laboratory have yet allowed themselves to be seduced by the special difficulties attending this sort of work; urged on the one hand by the craving after an imposing array of cases — somewhat ad captandum vulgus — and sternly restricted on the other side by various personal considerations (such as restiveness and fatiguability of the youthful subjects, fear of deranging school hours, etc.), they have too often fallen into almost incredibly hurried and inadequate methods of testing. Here, again, mere goodness of intention will not avail beyond a very limited extent, for the most painstaking work is far from entitling us to assume that the observational fallacy has been reduced to insignificant dimensions; we can have no satisfactory guarantee, until some method has been devised of precisely measuring the disturbance, and this does not seem to have ever been attempted.

The above criticism, of a perfectly general nature, must suffice for the bulk of the researches cited in this chapter; later on will be found a more detailed examination of those three particular ones which have dealt with precisely the same topic as the present article. If here methodological imperfections have admitted of formulation with unusual sharpness, the fact must by no means be taken as an especial condemnation of these and kindred experiments. Certain faults have, indeed, been especially prominent, as, for instance, the large errors of observation; but, on the whole, the majority of them would appear to contain at least as much good solid work as most of those more strictly confined to the laboratory and to a very small number of "trained" subjects; the former have only afforded a firmer foothold for criticism, because they have confined the question to a more simple unequivocal issue — though not yet nearly *enough* so — and because they have assailed their problem in a square positive manner. The final inconclusiveness of all their labor is not so much due to individual shortcomings of the investigators, or even of the whole branch of investigation, as to the general non-existence of any adequate system for proving and measuring associative tendencies.

Under all these circumstances, in spite of the many previous inconclusive and negatory verdicts, the question of correspondence between the Tests of the Laboratory and the Intelligence

of Life cannot yet be regarded as definitely closed. The only thing so far demonstrated is that the old means of investigation are entirely inadequate. The present undertaking, therefore, has only ventured once more to approach the problem, because believing to have elaborated a new and reasonably complete methodological procedure, such as appears capable of at last bringing light upon this and innumerable other important regions hitherto inexplorable.

CHAPTER III.

Preliminary Investigation.

1. *Obviation of the Four Faults Quoted.*

In the last chapter, four grave faults have been charged against the entire antecedent literature on the present topic. The first thing insisted upon was a *precise quantitative expression derived impartially from the entire available data;* we must renounce adroit manipulation of tables and graphs, still further rounded into the desired shape by ingenious argument; the whole of our experimentally gained figures must without any selective treatment simply of themselves issue into one plain numerical value (varying conveniently from 1 for perfect correspondence down to 0 for perfect absence of correspondence); this will here be done in the method that has been successively elaborated by Bravais,[1] Galton,[2] and Pearson,[3] and whose formula will be found on page 252; in addition, lists of individual amounts will be given in full as originally obtained, and therefore can be freely used either for checking the present results or for other inquiries. The second requisite was the probable error; concerning this it may at once be remarked that indispensable as is some evaluation, yet here less than anywhere else have we need, or even possibility, of rigorous exactness; approximate estimates will be appended to each correlation in tables. The third fault indicated was the one deriving from the errors of observation; little can be said in this place concerning the best means of reducing these to a minimum, for on such head our requirements are scarcely different from those already prevailing in all serious psychological research; only some matters of special interest will be briefly touched upon while describing the procedure of the present experiments in the next chapter. Much more important for us is the fact that

[1] Memoires par divers Savans, T. IX, Paris, 1846, pp. 255-332.
[2] Proceedings Royal Society of London, Vols. XL and XLV.
[3] Philosophical Transactions, R. S. London, Vol. CLXXXVII A, p. 164.

the total effect of all such errors can be measured *en masse* and mathematically eliminated, and that until this has been done, no correlational value can be assumed as even approximately accurate. The formulæ for this purpose are given and explained in the already mentioned article;[1] sufficient for the present practical purposes will be briefly recapitulated at the end of the next chapter.

The remaining point is that of irrelevant factors; this also is more fully explained in the said article; it involves a thorough preliminary investigation of all the terms concerned, without which the most skillful experimentation and lucid exposition will only be wasted labor; the produce of such preparatory exploration will form the remainder of the present chapter, while the processes of calculation will be given at the close of the next one.

2. *Definition of the Correspondence Sought.*

The first step towards eliminating irrelevancies is to clearly lay down how much we are to consider relevant, or in other words to properly define the problem at issue. As already stated, universal correspondences can never be the subject of investigation; in practice we are forced to introduce a large number of conventional restrictions, and for profitable work these must be explicit and unequivocal.

Let us first take that of *Kinship*. Putting other animals out of the question, we clearly cannot pretend adequately to sample even the whole existing human species. In order to obtain the simplest and least ambiguous results, it might seem desirable to reduce this source of variation to the least possible dimensions; an ideal experiment would then be wholly confined to a number of sets of brothers or sisters and to determining how far the more intelligent brother is also the better discriminator. But these narrow limits are most inconvenient on practical grounds, and even theoretically there appears no great objection against extending the kinship to any range that does not introduce inconvenient complications; we may eventually find it necessary to exclude differences of social stratum, of sex, etc.; or it may, on the contrary, be found allowable to admit all these and even some amount of internationality.

Next, we must bear in mind that the action of correctly distinguishing between two sounds or weights is a matter depending on many factors, and we must decide how many of these should be rejected as foreign to our purpose. In the present case, it seems best to limit the object of our research to that portion of the discriminating act which appears to constitute its

[1] "The Proof and Measurement of Association between Two Things."

specific core, excluding as far as possible such more outward influences as Zeal, Endurance, Manual Dexterity, Memory, etc. The last named requires especial attention, since it necessarily enters into all these mental tests. Its influence will greatly differ according to the method of procedure: the interval intervening between the two compared sensations may vary from a small fraction of a second to several minutes; it may leave the reagent's attention undisturbed, or it may make distracting calls upon it (such as causing him accurately to adjust an instrument). One of the investigations cited in the last chapter has gone so far in this direction, that a test called by the experimenters themselves "Perception of Pitch" is by the compiler preferably termed "Pitch *Memory*."[1] Now, the correlations of Memory — as far at any rate as my own researches have hitherto gone — would indicate laws entirely different from those of Discrimination; if this be confirmed, any interference of the former factor may gravely perturb an investigation into the latter.

Thirdly, the correspondence selected for inquiry in the present case is that between *natural innate faculties*. By this definition, we explicitly declare that all such individual circumstances as after birth materially modify the investigated function are irrelevant and must be adequately eliminated; our results might, therefore, be wholly vitiated if we threw together people in disparate ages, those in full vigor and those tired or ill, those who have already practised the test in question and those to whom it is new, etc. To obviate this, we are obliged to search through the records of previous work, so as to ascertain all the influences that have been found seriously to affect any of the variants now in question. The chief results of such a preparatory investigation will now be briefly detailed, and for the sake of conciseness and unequivocality we will at once as far as possible explain and correct these antecedent data by collating them with the information subsequently derived from the present experiments themselves. The most prominent turn out to be Practice, Age, and Sex, which will be discussed in this order.

3. *Irrelevancies from Practice.*

The importance of having defined our correlation will here at once be evident. For if we had wished to inquire whether

[1] Some experimenters (Lehmann, Angell), it is true, have found that "correctness of sensory judgment is practically independent of time interval" up to at least a minute, and even of deliberate distraction (Angell, Wundt's Phil. Stud., Vol. XVII, p. 11). I have, however, been unable to convince myself that this conclusion holds at all good for the ordinary conditions of experiment.

sensory acuteness and general intellect are correlated *dynamically*, if (as stated by many persons on the strength apparently of a priori reasoning) we had assumed that the discrimination of minute differences of sensation "is to be cultivated as the foundation of all intelligence,"[1] then we should have had to admit the variations due to Practice as perfectly relevant and we should have looked for a continual expansion in people's general ability in proportion to the labor they had expended on distinguishing tones, shades, and weights from one another. In the present experiments, however, it has been preferred to commence by investigating the *statical* relation; it has not been asked whether Intelligence is produced by development of sensory acuteness, but whether the former original endowment is on the whole accompanied by a corresponding amount of the latter also. From this it follows that we are bound to carefully eliminate differences of previous exercise.

(*a*) *Pitch.* In this branch of Discrimination the effects of Practice are especially conspicuous, but nevertheless they are not very easy to trace out with the quantitative precision required for our purpose. Experiment has, indeed, unanimously demonstrated that the threshold of discrimination to be reached by trained and competent acousticians, even when using quite different apparatus, is in the immediate neighborhood of 1/3 v. d.;[2] but there is no such general agreement concerning the average threshold of "unpractised" persons. Delezenne, for instance, finds that an interval equivalent in the centre octaves to about 1 v. d. "becomes sensible to the least practised ears, as I have assured myself on several people,"[3] But Preyer, on the other hand (though quite agreeing with Delezenne as regards the powers of practised acousticians), tried a few unpractised persons and found that they could not all decide with certainty unless the two tones differed by as much as 8 v. d.[4] And

[3] Die Grenze der Tonwahrnehmung.

---

[1] Pulling: Teachers' Text book of Practical Psychology, p. 16.

[2] In the present work, it is taken that a threshold obtained in v. d. (= vibrations difference) for any tone within the two octaves above the middle C may be assumed also to hold approximately good for the remainder of these two octaves and both above and below gradually to augment. So much appears sufficiently demonstrated by the works of Preyer (Die Grenze der Tonwahrnehmung), Luft (Wundt's Phil. Stud., Vol. IV, pp. 511 ff.), and Meyer (Zeit. f. Psych. u. Phys., Vol. XVI, p. 352). Hence the results of all experiments conducted anywhere near the centre of the ordinary musical scale admit of being easily collated with one another. For procedure in comparing any values obtained by the method of "Minimal Changes" with those by "Right and Wrong Cases," see Lorenz (Wundt's Phil. Stud., Vol. II), Merkel (*Ibid.*, Vols. IV and VII), Kämpfe (*Ibid.*, Vol. VIII), and Mosch (*Ibid.*, Vol. XX).

[4] Recueil des travaux de la Soc. de Lille, 1827, p. 4.

when we come to the more extensive experiments of Cattell and Farrand upon male and female University students, we find that the average error for the F below the middle C was over a whole tone, which (after making all possible allowances for diversity in procedure; both experiments were conducted on monochords) must be taken as at least twenty times worse than the results of Delezenne.[1]

This and similar apparent discrepancies, however, seem to proceed from a too vague and also too narrow conception of "Practice." Many writers freely make assertions concerning "highly trained reagents" (geübte Versuchspersonen) without stating — often, it would appear, without clearly realizing — whether the latter are merely trained in music generally, or have had special practice in distinguishing minute differences of Pitch. Other authors, on the contrary, term all their subjects "unpractised," even though accomplished musicians, if they happen to be new to this particular experiment; in such sense must be taken Delezenne's designation "les oreilles les moins exercées," for his reagents seem from the context to have been distinctly above the average as regards general musicality. Now, though the hyperacute sensitivity characterizing the acousticians has *not* been found (by the present writer at least) in most musical performers, even professional, yet the latter are at any rate considerably superior to the average person. Thus we so far have three very distinct grades of training: acousticians, musicians, and the rest.

There is also another kind of practice that must always be duly considered, namely that gained during even brief experiments. The Columbia undergraduates, for instance, who had a monochord put into their hands and were told to forthwith adjust it so as to produce unison with a previously given note, were, as regards training, almost as far removed from subjects whose examination lasts a quarter of an hour, as these again are from the long exercised reagents of Stumpf, Luft, etc.

Lastly, there is a factor which though analogous to Practice yet must not be too summarily identified therewith; this is the influence of General Culture. It will require discussion in some detail, as it does not seem to have hitherto gained much attention, since it is peculiarly liable to engender fallacies in comparative tests of children's discrimination, and may eventually prove of profound theoretical importance. A glance at Table V will present a very marked inferiority on the part of the villagers as compared with the better social classes, for the former have a threshold more than twice as great as the latter. Small as is the number of cases involved, the discrepancy is so

[1] Psych. Rev. Monograph Supplement, June, 1901.

large as practically to exclude mere accident.[1] The next readiest explanation is that villagers have far less opportunities of hearing music. But nearer investigation does not very much confirm this view; for the village in question rejoiced in the possession of an unusually fine set of church bells, and whoever has listened to a band of sturdy yeomen ringing for eight consecutive hours through all the possible "changes" will realize that those in the neighborhood have ample opportunity of hearing musical intervals. (The present writer had the misfortune to reside within a few yards of the said church.) Moreover, with one exception, all the villagers examined were in the habit of singing at home; while two of them were no mean performers on the violin and organ respectively. The violinist, it is true, exhibited the same discrimination as the average good musician; but the organist formed no exception to the general obtuseness, other than a far quicker capacity for improvement.

The same phenomenon is equally conspicuous among the young; for the village children, in spite of regular instruction and practice in singing, had a threshold twice as great as that found in the high class school. Also the relation between the children and the adults tells a similar tale; for in those social strata which continue after full growth to fully exercise their higher mental capacities, there is no appreciable alteration of ability to distinguish tones; the high class school has precisely the same average as the cultivated grown-up person. Among those, on the other hand, who at an early age are compelled to turn all their energy to muscular activities, we find a correspondingly rapid falling away of discrimination; bad as the child villagers were, those adult proved themselves nearly twice as inapt.

The only other experiments explicitly in this grade of society, with which I am acquainted, are the interesting ones of C. Myers;[2] and to these, without much straining, a similar interpretation may be given. His European village children (many of them possibly very young; unfortunately the ages are not shown) present an even lower average than those in Table I; that his adults slightly improve, while mine, on the contrary, go down, may well be attributable to the known habits of self-cultivation characterizing the Scotch peasantry. Myers' Papuan children, with only a smearing of alien education, are accordingly worse than the Europeans of any age or class; and on returning to the more congenial occupations of

[1] The improbability of mere chance works out mathematically to about 100 to 1 for this series of observations alone, not to mention the corroborative evidence of the children and other experimenters.

[2] Archives of Otology, XXXI, 4, 1902.

pearl-diving and cannibalism, their discriminative powers appear to sink lower still.

There is thus considerable evidence that the ability to discriminate pitch is largely affected by deprivation of General Culture. At the same time, this influence is only conspicuous in tests of an unfamiliar character; the villagers were incompetent at the—for them useless—task of distinguishing tones, but they show no inferiority whatever in the more practical faculties of telling one shade and weight from another. It would therefore seem that General Culture is not an independent factor that may be superadded to special sensory training, but no more than a possible partial substitute, just as the carbohydrates can excellently supplement but never supersede food-stuff containing nitrogen.

The various effects of all these degrees of Practice may now be expressed roughly enough, but still *quantitatively*, in the following tabular form: [1]

Median threshold for Discrimination of Pitch among adults.
(*Expressed in v. d. for the two centre octaves.*)

	Papuans	European Villagers	Non-Musicians of General Culture	Musicians	Specially Practised Reagents
With a minimum of fore-exercise.	—	30	10	4	½
After 15 minutes good fore-exercise.	16	8	4	2	⅓

[1] The Table appears to bring the various results of the best workers into very good harmony with one another and also with my own. It is regretted, however, that there is one exception to this general reconciliation; for it has been found impossible satisfactorily to accord the above estimates with a noteworthy series of experiments at Iowa in 1896, under the general direction of Seashore. There, the male University students showed a median discrimination of about 10 v. d., and the women one of about 9 v. d. These values, taking all things into consideration, appear at least twice as low as the analogous ones of Delezenne, Preyer, Gilbert, and myself. Moreover, it is even harder to reconcile Seashore's results from adults with his own simultaneous ones from children 10-14 years old; for the latter perfectly coincide with our table, showing a discrimination of about 4 v. d., and would therefore have double the sensitivity of the adults!

It must also be mentioned that Seashore arrives at a very different opinion from the above as regards the general effect of Practice. He

(*b*) *Sight.* In visual discrimination there is evidently less scope for further improvement by special training, seeing that the ordinary necessities of daily life are already sufficient to call forth a large portion of most persons' potential faculty in this respect.

But even here a considerable residuum of dormant power usually remains over and may be awakened on sufficient exercise. Schirmer,[1] for instance, found his threshold to continually diminish for about a week of continual practice, after which it seemed to him to have attained its maximum, while Müller-Lyer[2] and Simon[3] continued to make appreciable improvement for many months. Simon further noted the curious fact that practice in judging with both eyes brought with it but little betterment in judging with either eye alone; but when the left eye had been practised by itself to its maximum powers, then the right eye also, although itself unpractised, was nevertheless found to have advanced to its maximum. My own experience fully coincides with this view that the generality of people can considerably reduce their threshold by practice. Here, however, no appreciable influence is manifested by General Culture; the adults of the diverse social classes show just about the same average, and also as regards the children the difference is about what was to be expected from the difference in conditions of test.

This visual disparity between trained and untrained is difficult to estimate quantitatively. For previous experimenters upon unpractised reagents never seem to have attempted more than a rough empirical gradation incapable of being compared with other work. Our evaluation must therefore rest solely upon the present experiments, which, being conducted by daylight, are far from guaranteeing sufficient precision on this head; but still, as they turn out to agree perfectly with the mean of previous records of trained reagents, in all probability they are approximately accurate as concerns untrained ones also. In this case, the median threshold for discrimination of medium shades of gray, after 15 minutes fore-exercise, may be taken as involving the following difference of luminosity:

Untrained Reagents	Trained Reagents
1/30	1/120

holds that neither musical education nor special training can materially affect most people's power of discriminating, and he supports his view by inquiries instituted among the parents of his children and also upon a few experiments.

[1] Arch. f. Ophthalm., XXXVI, 4.

[2] Arch. f. Anatomie u. Phys., 1889, Phys. Abth., Supplementband, p. 96.

[3] Zeit. f. Psych. u. Phys., Vol. XXI, p. 433.

It would thus appear that in this faculty the influence of training is considerable, but still only about one-third of that in discrimination of pitch.

(*c*) *Weight.* Here, curiously enough, Practice seems to have remarkably little effect; the most highly trained experimenter has shown no advantage over the first comer.

Weber, for instance, declares 1/40 to be the difference just distinguishable by "quite the majority of human beings, without any long preliminary practice;" [1] yet he himself, in spite of all his long labors, appears to have been much below this standard.[2] Similarly his successor, Fechner, after prodigiously extensive training, was in the end but a very moderate performer.[3] A more direct proof of the inefficacy of prolonged exercise is given by the case of Biedermann and Loewit; for these observers at the very beginning of their experiments found their threshold for one-half pound to be equal to 1/21; yet at the close of their protracted research, this threshold had only improved to 1/23.[4]

But however true this may be as regards training of very great duration, I have convinced myself that it does not hold good as regards the few minutes of fore-exercise; for my reagents have almost invariably discriminated better at the end of their fifteen minutes than when they first entered the room; sometimes the improvement is enormous.

We come, therefore, to the general conclusion that a few minutes' practice are necessary for most people to accustom themselves to the test, but that further training has little or no effect.

(*d*) *Intelligence.* As to the effect of training in this direction, there unfortunately appear to be no available data, except such conclusions as issue from the present experiments themselves. All that could be done before commencing work was to contrive that the reagents should, as far as possible, be on equal terms with regard to previous education.

4. *Irrelevancies from Age.*

This factor is obviously one that must largely influence both Sensory Discrimination and Intelligence, since nobody can suppose that any mental faculties remain at one constant level from first birth to the prime of manhood and on through the last senile decay. The matter acquires peculiar importance owing to the practical reason that we find it much easier to

[1] Tastsinn u. Gemeingefühl, p. 541.
[2] Annotationes anatomicae et physiologicæ, Prol. XVII.
[3] Psychophysik, Vol. I, p. 186.
[4] Berichte d. kais. Akademie d. Wissensch. zu Wien, Math. Naturw. Classe, Vol. LXXII, p. 343.

subject children to our experiments than to induce the same number of adults to let themselves be tested. Consequently, every research of this kind so far has dealt exclusively with reagents not yet beyond adolescence. We will again consider each of the four variants in turn.

As regards *Pitch*, the first notable inquiry into the development of discrimination appears to have been that of Gilbert, who comes to the conclusion that from the age of six to at least that of seventeen years there is a continual though irregular improvement.[1] But the next investigator, Seashore, arrives at the very different opinion that no betterment takes place after ten, at which period he finds children to be fully equal to average adults; he even goes so far as to pronounce that "the organ of Corti reaches its maximum efficiency at the age of about ten, and that it then begins to deteriorate."[2]

By the light of the previous section, however, it seems possible satisfactorily to reconcile these very divergent results. For we have just seen the immense effect of Practice, especially in this matter of pitch, and we may not unreasonably suppose such faculties to arrive at maturity earlier or later according as they have been more or less fostered by education, special or general. This hypothesis will be found frequently corroborated in the present work. The high class school perfectly harmonizes with Seashore's elder children in presenting no further increase of capacity after nine, at which age the average threshold already equals that of adults; and this agreement with Seashore extends not only to the relative powers but even to their absolute performances, for both lots of children show a mean of about 4 v. d. But when we turn to the villagers, then the accordance is no less entirely with Gilbert: from 5½ to 7 years, they average 40 v. d.; from 7 to 8, 23 v. d.; from 8 to 10, 15 v. d.; and from 10 to 14, 6-7 v. d.; and here again also the absolute values fairly coincide with Gilbert's, although the latter used such a different testing instrument as an adjustable pitch-pipe.

Even into very advanced life, the influence of Age appears still interflected with the previously mentioned factor of Culture. For those adults who exercise their higher intellectual functions abide to almost the end of their days at their best level; nothing is observable to correspond with the generally believed diminution of their audible range from 11 octaves to 10. To myself, it was no small surprise to find that the persons of 60, 70, and even 80 years could discriminate quite as acutely as those in their physical prime. But among the grown-up villagers there seems to occur a marked bifurcation: those

[1] Stud. Yale Psych. Lab., 1893. [2] Stud. Psych. Iowa, Vol. II.

of them who on leaving school take to violin playing, hand-bell making, etc., continue to develop the discriminative function until it eventually becomes quite as fine as if it had enjoyed a better start; but those who have not had such special later advantages will not be saved by occasionally hearing music from lapsing into great dullment.

Turning next to *Sight*, Gilbert's very extensive experiments again present a continual growth perceptible even up to the seventeenth year; between nine and fourteen, the ages chiefly entering into the present work, the average threshold becomes reduced by about one fourth. My own results turned out quite similar as regards the village children, but in the higher class school development appeared to occur earlier. With respect to Old Age, this again appeared to bring with it no impairment whatever; the supposed "sharpness of young eyes" did not make itself manifest.

In respect of *Weight*, Gilbert's curves show a somewhat quicker arrival at maturity, no improvement being evident after about thirteen years old.[1] The present experiments quite concorded in that the younger children were almost equal to the older ones and both were not far from adults. In Old Age, we once more find no appreciable loss of power.

Finally, we come to the effect of Age upon Intelligence. On this matter general opinion seems to be sharply divided; for some assert that, other things equal, a child must necessarily get cleverer as he grows older; while others hold Intelligence to be equally manifest at all ages after infancy and to be easily distinguishable from the gradually amassing stock of acquirements and proficiencies. As before, in default of any positive antecedent data the present experiments could only keep the point in view and endeavor themselves to throw light upon the question.

5. *Irrelevancies from Sex.*

This factor evidently requires consideration, seeing that in some of the previous experimentation males and females have been thrown together without apology, while at other times these have been regarded as obviously heterogeneous to one another.

Commencing with children, the only important evidence concerning *Sight* and *Weight* seems to be that of Gilbert,[2] who comes to the conclusion that the sexes not only differ but that this disagreement is a quantity perpetually fluctuating from year to year according to the various phases of growth and especially of puberty. As regards *Pitch*, the chief testimony is

[1] Stud. Yale Psych. Lab., 1894, p. 59. [2] *Ibidem*, p. 57.

that of Seashore, who declares boys and girls to present not the least appreciable difference.

Now, it is very improbable that the various senses should really be so unlike in such a respect, and accordingly it was not surprising to find that in the present experiments the village boys and girls showed quite analogous differences in Pitch also. Perhaps Seashore's results may be reconciled in the same way as before, that is, by considering that his children appear to have been better educated generally and therefore to have passed beyond the perturbations characteristic of the growing phases.

With respect to the influence of Sex upon adults, Seashore's women present a slightly better discrimination, but the difference is only such as may well be attributed to their more general study of music at the age in question. My own results coincided, in that both sexes appeared perfectly equal in all three senses tested; no support whatever was given to the popular assertion that men are much superior.

6. *The Elimination of these Irrelevancies.*

Thus we have come upon a considerable number of factors which evidently disturb the relations that we are about to investigate; and the more we sharpen our criticism, the smaller aberrations shall we be able to bring to light, until the latter begin to appear infinitely numerous and hopelessly unavoidable; we successively encounter illegitimate deviations proceeding from hour of test, from temperature, from fatigue, from state of health, from fullness of stomach, from habitual and occasional consumption of alcohol and caffeine, and so on without end. Eventually, our experimentation will arrive at the condition of the hysterical person who has found out some or other medical objection to every description of food — and so dies of self-starvation. To undertake any investigation at all, our attention cannot be confined to the detection of these impurities, but must take the further step of ascertaining which of them we can and cannot afford to neglect in practice. With this view, we have in every case insisted upon obtaining *quantitative* estimates of the differences actually produced by the various intruders, and we have found them to vary from the extravagant proportion of 1:60 down to inappreciability; from these general computations, it will usually not be hard approximately to pick out the amount applicable to any particular experiments.

So far, however, our information is still almost worthless. For the perturbance into which we are inquiring does not depend simply from the above average difference produced in the measurements by the intruder, but upon the *ratio* of this special

difference to the total average difference found in an assemblage of individuals from both the disparate classes; this latter difference will clearly be the greater of the two, seeing that it derives from many other differentiating causes in addition to the special one; the ratio will very approximately present the correlation between the disturbant and the term disturbed.[1] Even yet, though we have thus obtained all the requisite data, we cannot utilize them to measure the perturbance until we have further obtained a mathematical equation capable of performing this office; this will be given at the end of the next chapter; by its aid and that of the foregoing inquiry, we are finally enabled to decide which of the irrelevancies produce a falsification of appreciable size as compared with the probable error; all of less magnitude may be left out of consideration, as their elimination would not be of the slightest practical advantage.

To avoid more tediousness, we will here take only two sample cases to illustrate how the decision is actually reached as to whether an irrelevant factor be really of formidable nature. In tests of Pitch, say, it is desired to know whether the reagents may properly consist of non-musicians, mixed with musicians. Our Table (page 231) shows us that the former have an average threshold about twice the size of that of the latter; next, on taking a number of thresholds of both non-musicians and musicians thrown together, we find that the ratio between the averages of the worse and better halves respectively comes to something very near 3:1 (see any of the quoted works); hence the irrelevant correlation is about 2/3 or 0.62. Applying the appropriate formula, we find that under such circumstances a real correspondence of say 0.50 would be unduly deflected by about 0.14. As the experiments were being designed on such a scale as to give a probable error of only about 0.03, the perturbance must be pronounced very appreciably falsifying.

Let us consider the analogous case as regards the sense of Sight. Here also, it may safely be assumed that diversity of daily occupation among the reagents will have led some more than others to practise this particular faculty, and further that the extent of this discrepancy will on the whole certainly be less than that between musicians and non-musicians (seeing that very few people spend hours a day in discriminating small variations of light and shade); again, the general effect of practice in this sense has been found to be about one third of that in Pitch (p. 232), while the total average difference turns out to be about the same as for the latter; hence this time, the irrelevant correlation will be at any rate much less than one

[1] See "The Proof and Measurement of Association between Two Things." This *Journal*, Vol. XV, 1904, pp. 72-101.

third of 0.62. On once more applying the suitable corrective formula, we find that any irrelevant correlation of 0.21 would falsify a real correspondence of, say, 0.50 by an amount of only 0.01. Thus we have ascertained that the deviation caused by difference of Practice is in this sense not likely to affect our result by more than a very small fraction of the probable error and may well be neglected.

In this way, a large number of irrelevant factors may be summarily dismissed from consideration; others, either from their amount or from the doubtfulness of the evidence concerning them, must be carefully kept in view; while some will be found of an unquestionably falsifying nature. The first employment of our knowledge is so to order our experiments from the beginning, both as regards selection of reagents and procedure in testing, that appreciable perturbance may be escaped. Next, and yet more important, we have learned the directions from which serious danger is to be apprehended, and forewarned is forearmed; we are enabled to so conduct our work, that the residuum of deviations which could not be excluded actually may instead be afterwards eliminated with mathematical exactness from the final results.

7. *Alternatives and Equivocalities.*

Notwithstanding the exhaustive selective process which will have had to be executed in order to sufficiently eliminate all these irrelevant factors, there will generally still remain over a certain number of experimental methods that at first sight appear almost equally eligible.

As regards Intelligence, to begin with, there is a considerable variety of ways by which estimates can be gained, and most people would appear to enjoy very decided views as to which are the most satisfactory; but since the convincement of their opinion usually stands in inverse proportion to its evidential value, it is perhaps safer to begin with the methods nearest to hand and gradually discover for ourselves their relative advantages. In doing so, two points must always be carefully kept asunder: first, the *reliability* with which any system of measurement represents any particular form of intelligence; and secondly, the claims of the said form of intelligence to merit the name. The former point must be definitely ascertained in the course of the experiments, while the latter, though a very desirable piece of information, may or may not be eventually elucidated by the whole investigation.

Sensory Discrimination will usually offer a still greater field of choice. About the mode of interrogation, it here need only be mentioned that the present wants are not necessarily identical with those of other psychological work. For instance, it is

well known that the sensory threshold has really two different values, according as the examination proceeds from greater to less differences or *vice versa;* now, for questions specially concerning this threshold as such, it is desirable to take the mean between the upper and lower values; for the present purpose, on the other hand, more regular results appear obtainable in a given time by determining only the lower threshold (the reason seems to be that the reagents become less confused when the changes are confined to the one direction).

Then comes the question as to what precise portion out of the whole sensory range should be chosen as the theatre of our experiments. For our pioneering work, at any rate, it would appear unquestionably best to commence with that part where the results are least exposed to irregularities, complications and unknown factors; this will always lead us to somewhere near the centre of the range.

Lastly, we must consider the influence of different apparatus. It is a much more prominent factor in some senses than in others. In Pitch, it appears to be minimal; highly trained observers, however variously tested, show little more diversity than can be satisfactorily accounted for by individual disposition. Delezenne,[1] Seebeck,[2] Weber,[3] Preyer,[4] Appunn,[5] Stumpf,[6] Luft,[7] and Meyer,[8] though using such widely differing instruments as monochords, reed-pipes, and tuning forks, obtained results of which the largest is little more than double the smallest, and even this small difference appears chiefly attributable to difference in mode of interrogation. Among less practised reagents, indeed, sensibility will sometimes be found to vary enormously with the kind of timbre, one person doing much better when there are no appreciable overtones and another *vice versa;* but still such discrepancy is generally traceable to diversity of previous habit and continually diminishes with further training. In Visual Discrimination, the results have been considerably less uniform. It is true that the majority of competent observers, Kraepelin,[9] Volkmann,[10] Aubert,[11] Masson,[12] Merkel,[13] etc., though employing such various in-

[1] Recueil des travaux de la soc. de Lille, 1827, p. 4.
[2] Poggendorf's Annalen, Vol. LXVIII.
[3] Pogg., XIV.
[4] Die Grenze der Tonwahrnehmung.
[5] *Ibidem.*
[6] See ref. to Meyer, note 8.
[7] Wundt's Phil. Studien, Vol. IV.
[8] Zeit. f. Psych. u. Phys., Vol. XVI.
[9] Wundt's Phil. Stud., Vol. II.
[10] Fechner's Psychophysik, Vol. I, p. 148.
[11] Physiologie der Netzhaut, 1865, p. 58.
[12] Ann. chim. phys., 1843.
[13] Wundt's Phil. Stud., Vol. IV, p. 566.

struments as Masson's disc by daylight, the same by artificial light, the shadow-method, the episcotister, and illuminated matt glass—all agree that the most favorable medium shades of gray can just be distinguished from one another when the illumination differs by about 1/120. But on the other hand König with Brodhun,[1] Helmholtz,[2] and Bouguer[3] arrive at a threshold twice as big, while Schirmer[4] and Volkmann (in his later experiments) come to one nearly twice as small. That, however, the lion's share of these dissimilarities may be solely attributed to difference of instrument is shown by the largest variation occurring in one and the same person: Simon, when using the platinum lamp of König, has a still worse threshold than the latter; but when employing a disc like Schirmer, surpasses even this observer. The discordance assumes far greater proportions when we come to Discrimination of Weight: for widely apart are the values successively obtained by Weber,[5] Fechner,[6] Biedermann and Loewit,[7] Hitzig,[8] Jacoby,[9] Merkel,[10] Müller and Schumann,[11] Martin and Muller,[12] etc.; on the one extreme we have Biedermann and Loewit who could clearly perceive a difference in a 2 lb. weight if it were increased or diminished by so little as ½ oz.; on the other side, we find C. Jacoby whose five thoroughly trained and competent reagents required for the same purpose an increase or reduction *twenty-four* times greater, a discrepancy that for the main part may safely be attributed to difference of apparatus.

This multitude of gross fluctuations requires careful analysis. A certain number merely imply greater or less difficulty in the performance and consequently a simultaneous rise or decline for the generality of reagents. Others, again, derive from difference of individual disposition; the larger these are in any procedure, the more accurately will any functional correlation be able to be calculated; but they must not be too summarily confounded together, for possibly one procedure may exhibit greatest sensitivity to previous practice, while another may be the most delicate barometer of fatigue or ill health, and yet a

[1] Sitz. Ber. d. Berl. Akad., 26-7-1888 and 26-6-1889.
[2] Physiol. Optik, p. 315.
[3] Aubert, Phys. Optik, 488.
[4] Arch. f. Ophthalm., Vol. XXXVI, p. 121.
[5] Tastsinn u. Gemeingefühl.
[6] Psychophysik, Vol. I.
[7] Berichte d. kais. Akademie d. Wissensch. zu Wien, Math. Naturw. Classe, Vol. LXXII.
[8] Neurol. Centralblatt, 1888.
[9] Arch. f. Path. u. Pharmak., 1893.
[10] Phil. Studien, V.
[11] Pflüger's Arch., XLV.
[12] Zur Analyse der Unterschiedsempfindlichkeit.

third may reveal the largest correlation with intellect. The remaining fluctuations derive from causes so obscure, that for the present we must call them chance irregularities tending only to shroud and disguise our results.

From these considerations, it is clear that an alteration in method of experiment may result in transforming the correlation. But this further complication, far from being a real disadvantage, opens out a rich and virgin field to investigation, for it is the most promising means of penetrating into the correlation's essential nature. Eventually results will be gained of such greater generality, that they will stand out constant among these superficial changes, as the main features of a landscape abide immovable in the passing variety of cloud and sunlight.

CHAPTER IV.

DESCRIPTION OF THE PRESENT EXPERIMENTS.

1. *The Choice of Laboratory Psychics.*

We will now turn to a description of the experiments that form the basis of the present article. Their many deficiencies can scarcely be clearer to any one than to their author; so true is it that we first learn how properly to conduct any experiment—when we have ended it.

As regards the nature of the selected Laboratory Psychics, the guiding principle has been the opposite to that of Binet and Ebbinghaus. The practical advantages proffered by their more complex mental operations have been unreservedly rejected in favor of the theoretical gain promised by utmost simplicity and unequivocality; there has been no search after condensed psychological extracts to be on occasion conveniently substituted for regular examinations; regardless of all useful application, that form of psychical activity has been chosen which introspectively appeared to me as the simplest and yet pre-eminently intellective. This is the act of distinguishing one sensation from another.

With respect to the particular senses preferred, the present experiments have been confined to Hearing, Sight, and Touch. The other five, Taste, Smell, Pain, Heat, and Cold, do not admit of such practicable or satisfactory examination; also, probably on this account, they have as yet been investigated very incompletely, and therefore do not form a good unequivocal foundation for research of more advanced order. Further, in the chosen three we have already the widest range of type: for Touch is the most direct of the senses, the physiological organ being apparently of such a simple structure as to convey

the stimulus to the brain in a purely mechanical manner; Sight, on the other hand, offers the most perfect example of peripheral transformation, seeing that our visual presentations are but very remotely derived from the really external ether waves with which they are popularly confused; while Sound gives us a half-way stage between the above extremes.

In all three cases, the test has been of relative, not of so-called "absolute," Discrimination; the trial has not been as to how small an external stimulus can cause a sensation perceptible at all, but as to how great the difference in the external stimuli has to be for the reagent to notice any difference in the sensation; every one knows the uncertainties attending the former kind of investigation. Similar motives have in Sound made Pitch seem preferable to Intensity; and in Light, Luminosity to Color. It is perhaps less easy to justify Touch being represented by that form of it often termed the "muscular sense," which despite its notoriety and historical importance is now well known to be really most complex and obscure.[1] Among other reasons for this choice, it was desired to see whether any correlation of Discrimination with Intelligence might not reasonably be attributed to adroitness in outward approach to the distinguishment rather than to superiority in the essential act itself; should this be the case, then the correspondence should be much more manifest in an active practical comparison of two weights than in the purely passive acceptance of two tones.

In short, the experiments were so chosen that any conclusions very uniformly attained in these three ways might be provisionally considered to hold good for Sensory Discrimination in general. ———

It may here be remarked that the present experiments were not primarily designed and executed for the sake of Discrimination itself, but as the indispensable basis for an investigation into Memory and Imagery. Only afterwards was it decided to publish the results on the former head separately, so as to keep the present article within manageable length and at the same time to secure for it greater unity and lucidity.

2. *The Instruments.*

The apparatus with which these inquiries were conducted were not of a very new or elaborate nature, my object at present being merely to make a practical and convenient application of the existing laboratory methods. Moreover, while naturally

[1] It is here by no means intended to assent to the identification of the feeling of Effort with any combination of touch sensations, but only to admit that the former is in practice chiefly estimated through the mediation of the latter.

endeavoring to minimize all errors proceeding from mechanical imperfection, I have become quite convinced that faults arising from such a cause are in this case vanishingly small as compared with those proceeding from other sources.

(*a*) *Sound.* Like the experiments of Delezenne and Cattell mine were conducted by means of a monochord, but of a special kind made under my direction for this purpose; it is furnished with a Vernier scale, whereby differences of pitch can readily be produced down to ⅓ of a vibration; as the experiments were limited to the immediate neighborhood of the E above the middle C (reckoning the latter at 330 vibrations per second), the smallest securely obtainable difference amounted to 1/132 of a musical tone.

To the accuracy of such an instrument many theoretical objections may be raised, as unevenness of the wire, inequalities of tension, etc. However, experience has shown it to be reliable to the range above mentioned, which is ample for the present purpose. It was first tested in the usual way, that is, by simultaneously sounding two notes at a given small interval and then counting the interferences in the sound-waves; I had no difficulty in producing good reliable "beats." The instrument has further been well checked empirically, for more than one reagent has proved able correctly to discriminate down to the extreme limit. I have also been fortunate enough to obtain assistance in this manner from Dr. Krüger; this psychologist and acoustician very kindly allowed himself to be tested with my machine and found his threshold to be only such a small amount greater than with tuning forks, as would naturally arise from his having had much more practice with the latter instrument.

The principal crime generally charged against monochords is that they give far stronger overtones than do tuning forks and that consequently tests upon the former may not be comparable with those upon the latter. This point has already been discussed, and our conclusion was that all the different instruments hitherto tried had led to very similar *average* thresholds (in this respect being very unlike discrimination in Sight and Weight). In any case, there is no reason whatever to suppose that the results given by the overtoned instruments are at all less regular, and this is here the only matter of importance.

As a set-off against this one merit of comparative freedom from overtones, tuning forks are in so many other respects difficult to manage, that I should not personally prefer them except for use in an exceptionally well equipped laboratory. To bring them to sound, they have to be either struck with a hammer or stroked with a bow, and the consequent accessory

noises and tones can hardly be reduced to such a minimum as is easily attainable in plucking the monochord; also, the tone from the fork only remains constant for a very short time, after which it rises very deceptively; further, it is very difficult to obtain two tones of sufficiently equal loudness, without using a special striking apparatus which again involves other disadvantages. Moreover, it is almost impossible to obtain enough range of tone in any satisfactory manner, especially as even the best tuning forks have appreciable overtones unless placed upon resonators to preferentially intensify the ground-tone; the device of a different fork for each grade of pitch is of very dubious merits; and when the common custom is followed of using one fork with the sliding regulator on it while the other has none, the overtones become so dissimilar as frequently to vitiate the whole experiment. The last objection can be partially met by having on each fork a separate regulator very light and low; but the first and second difficulties are very insufficiently overcome by the usual expedients, such as moving the fork to and from the reagent's ear; to fully obviate them, it is at least necessary to be able to conduct the sound from one room to another, so that the experimenter remains with his forks and opens the conductor just when the tone is pure and true, while the reagent sits alone and hears only what he is intended to hear; but such a procedure is quite inapplicable to the inexperienced subjects requisite for experiments like the present ones.

(*b*) *Light.* As we have seen, a great number of instruments have been at different times used for this purpose. Each of them possesses various advantages and disadvantages of its own. For my purpose, I constructed a graduated series of cards, each being slightly darker than the preceding one. The required delicacy was obtained by photographic means, on the principle that the darkness of a print will (for a certain short range of half-tints) vary almost proportionately to the time of exposure to light. Various ways of printing were tried; silver gave a very fine gradation, but necessarily introduced the disturbing element of color; carbon was found difficult to develop with sufficient evenness; final preference was given to platinum on the smoothest possible paper, and a series of prints were obtained of such differences that the extreme ranges would measure the dullest normal sight, while two neighboring cards could not be distinguished by the acutest vision.[1] The prints, each about 2″ by 1″, were then mounted on smooth cardboard, num-

[1] This method of constructing cards as visual tests seems to have been very minutely anticipated as long ago as 1896 by Marbe (see Zeits. f. Psych. u. Physio., Vol XII, p. 62).

bered on the back, and given a border about one inch wide of even black, so that the conditions of contrast should in all cases be approximately equal.

The evenness of the series was then tested practically on many reagents, by trying whether all pairs of cards at the same number of grades apart presented precisely the same difficulty of distinguishment.

As to the illuminating source, it unfortunately was not found practicable to conduct the experiment by the uniformity of artificial lighting. However, small differences of the absolute intensity of the illumination are known not to appreciably affect accuracy of judgment, and such was found to be actually the case as regards the inevitable minor fluctuations of daylight. The most important point was that the two cards to be compared should be illuminated to exactly the same degree. This was sought by placing them side by side on precisely the same plane and opposite the centre of an evenly lighted window. Most reagents had a marked inclination to consider one particular side darker; in some cases this was the right, and in others the left (I could not find that this tendency corresponded with right and left handedness respectively, as might perhaps have been expected in view of the experiments of Van Biervliet[1]).

The general luminosity of the cards was determined in the following manner. The lightest and darkest were placed in a dark room, and two candles were arranged in front of them in such a way that each threw a circular ray of light about one inch in diameter upon one of the cards. It was then experimentally ascertained how much closer to the illuminating source the darker card had to be, for the latter to appear just as light as the other. The square of the greater distance divided by the square of the lesser thus gave a measure of the relative brightness of the two cards under equal conditions. It would be superfluous here to enter into the various details adopted to make this test satisfactory, seeing that the result is at best only roughly approximate; for, among other things, the luminosity was thus tested by artificial light, while the discrimination was tried by the different luminosity and tint of daylight. Within the actual limits, however, it does not appear that the consequent error will be very considerable; hence, the value found seems sufficiently accurate to be of some interest, especially as it is difficult anywhere to discover quantitative estimates of the normal unpractised person's power to distinguish differences of light.

(*c*) *Weight.* For this test a graduated series of weights were

[1] L'asymétrie sensorielle, Bulletins de l'Académie des Sciences de Bruxelles, Vol. XXXIV, Série III.

constructed on Galton's convenient cartridge pattern,[1] all of precisely the same size, appearance, and balance; the lightest was 1,000 grains, and the others continually increased their weight in geometrical proportion. I found it necessary to considerably extend the range of differences; for some of my reagents could accurately distinguish Galton's finest degree, namely 1/100; while many perfectly normal persons showed an obtuseness that could not be measured even on the extremes recommended by him as being adapted for "morbid" cases.

3. *Modes of Procedure.*

(*a*) *Experimental Series I.* The reagents were the twenty-four oldest children of a village school in Berkshire, taken without any selection; they were tested in Light, Weight, and Sound. This school was particularly favorable for my purpose, as it was within 100 yards of my own house; all the children and their families resided in the immediate neighborhood, so that I could easily obtain any information concerning them; the rector and schoolmaster most obligingly gave their valuable co-operation, for which I hereby tender hearty thanks.

Each child was separately interviewed in my house, on a different day for each different sense. The test of Discrimination lasted fifteen minutes (and was then followed by test of Memory; the coincidence between these two is a good measure of the accuracy of both). No single trial was ever unusually prolonged, for fear of admitting the disturbing effects of fatigue, but further interviews were obtained when any doubtful points seemed to require clearing.

As regards the manner of interrogation, there was little hesitation in rejecting the method known as "minimal changes" in its purer form, which is dependent upon the reagent saying whether or not he can distinguish the difference between the two sensations offered to him; such a procedure appeared totally unfitted for such inexperienced persons. But still less applicable appeared the strict method of "right and wrong cases." The compromise was therefore adopted of searching for that threshold where the subject seemed able to give about 80% of his answers right. For similar reasons, preference had to be given to the "procedure with half knowledge" (halbwissentliches Verfahren) in spite of certain disadvantages;[2] in this, the reagent is informed that the two stimuli are different, but is left to decide for himself as to the direction of the difference.

The beginning of the test is not devoted to recording the largest possible number of answers, but to quietly affording

[1] Inquiries into Human Faculty, Appendix.
[2] See Kämpfe, Wundt's Phil. Stud., Vol. VIII.

the reagent a maximum of fore-exercise and at the same time to gaining a general idea of his threshold. Then, there is a steady progression from greater to smaller intervals, until eventually a threshold is found where he can just give eight right answers out of ten. He is further tried at a still smaller interval, to see if he makes still more mistakes and thus to confirm the fact that he has really reached his limit. And finally he is once more tried at a slightly larger interval than the believed threshold, to corroborate the former observation that he here makes less than two errors out of ten. This constant progression in only one direction appears to very much reduce the mental distraction especially inherent in all procedure "without knowledge," which is very great in unpractised reagents if tested with the usual oscillations to and fro between greater and smaller intervals. Against it may be urged that it finds only the lower instead of the mean threshold, but this is of no importance for our present purpose.

It was further considered that more regularity would be obtained by only recording those answers which were given under the most favorable conditions. Before taking down each reply, a chance of reconsideration was given by repeating the test in such a manner as to reverse the constant error of time and space.

The two stimuli followed one another in the manner found to be most adapted to accurate judgment and to effectually eliminating the influence of Memory. In the case of pitch, the interval from the beginning of the first tone to that of the second was found best at about three-quarters of a second. In some earlier experiments, the first tone was just dying away when the other began; but later, I stopped the first one altogether just before giving the other. There is some knack required to do this satisfactorily, and the practical effect of the change was, to my own surprise, inappreciable with most reagents.

The final measurements, just as they were obtained, are set down in the column under "Sensory Threshold" in Table I.

(*b*) *Experimental Series II.* This was executed in the same village school, but upon the next thirty-six oldest children, the tests being only in sound. Unlike the previous twenty-four, these were examined collectively, the total interview lasting about 1½ hours. The chief part of this time was devoted to instructing and practising them, and to finding out what was the lowest age fit for such a collective experiment. It became eventually evident that no usable results could be obtained at any rate from those below 5½ years, and thereupon all those under this age were excluded, leaving thirty-six for the real tests.

The latter were carried out in the following manner. Every

boy and girl was provided with a pencil and a piece of paper and had simply to write down 1 or 2, accordingly as he considered the first or the second tone to be the higher. The headmaster as well as the other teachers were present; a small prize was offered to stimulate attention, and energetic measures were found necessary to prevent cribbing. Ten test pairs of tones were given at about the following eight differences of pitch, 50, 33, 26, 20, 16, 10, 6, and 3 v. d.; thus in all, each child answered 80 times; in half the cases, the first tone was really the higher, and *vice versa*.

The marking was done by fully considering each child's whole paper, and then deciding as to what was the limit at which he might be expected to give about eight right answers out of ten. This method has seemed to me in such cases the most satisfactory, provided that the person marking has acquired the requisite experience by having previously examined in a thorough manner a great number of similar reagents, and provided the marking of the paper be done before receiving the intellective gradings (or else there is a great danger of "self-suggestion"). If this method be not adopted, recourse must be had to some purely formula reckoning of errors.

Despite all precautions to secure reliable results, I was unable to quite convince myself that such uncultured children could be treated adequately without elaborate individual attention.

(*c*) *Experimental Series III.* These experiments — confined to Sight and Weight — were made in a preparatory school of the highest class, which principally trained boys for Harrow. To the Principals, themselves old Harrovians, my hearty thanks are due for their kindness and cordial co-operation. As may well be imagined, the social standing and general culture of the reagents were the opposite extreme to that in the village school.

Unfortunately, these tests of Light and Weight had to be arranged at a few hours' notice and consequently were carried out under very unfavorable conditions. Out of the thirty-seven boys constituting the school, only twenty-four could be present, and of these again it was necessary to withdraw one from the results as being mentally too abnormal to be properly included with the others. In the next place, no masters were in the room after the first few minutes; in spite of the general excellent behavior, this relaxation of discipline must always be admitted to be a momentous circumstance. And finally, the visual and muscular senses—never well adapted to collective examination—had on this occasion to be tested with the apparatus intended only for individual work: the weights and the cards were continually passed round and round by pairs, ticketed 1 and 2 respectively; each boy then wrote down which of the two he considered to be the heavier or darker.

It was impossible to control whether they all handled the apparatus in precisely the same manner, or even to insure that they invariably gave their greatest possible attention to their tasks; moreover, some were inevitably more favored than others as regards intensity and evenness of illumination.

Owing to these facts, I brought away the impression that the experiments were chiefly interesting as enhancing the effect of *Goodwill*. For under better conditions, every reagent can be brought pretty well to try his best; but here, on the contrary, a wide range was observable in this respect, some being very zealous while others were visibly indifferent.

(*d*) *Experimental Series IV.* This series, which was in Sound only, took place in the same high class preparatory school, but now the circumstances were as propitious as above they were the reverse. Pitch is a sensory quality especially susceptible of collective test. The experiments were arranged and prepared with full deliberation. The entire school were available with only the exception of the above mentioned abnormal case, of one boy who had to leave the room before the end of the hour, and two who were that day absent; thus there were thirty-three complete results. Several masters attended, so that the strictest discipline was maintained throughout; there appeared no inclination to crib; every boy seemed perfectly to understand what was required and to be intent upon doing as well as possible. I am therefore inclined to attach as much value to this series as to Series I; for the cultured intelligence and long habit of examination possessed by these boys should compensate the individual attention given to the villagers.

The conditions entirely resembled those described in Series II, except that only 48 final tests were made, 6 at each of the following differences: 20, 15, 11, 8, 6, 5, 3, and 1 v. d. The intellective grading was not received by me until long after the sensory grading had been completed, so that the latter is free from danger of self-suggestion.

(*e*) *Experimental Series V.* These were executed upon 26 male and female adults (thus bringing the total number of reagents throughout the present experiments to 123).

The method was individual and precisely the same as that already described for Series I. But in arranging the composition of the reagents, instead of trying to obtain as homogeneous a set as possible, it was here rather sought to include the greatest variety; for although little can be proved in such a manner, much can profitably be suggested.

4. *The Estimation of "Intelligence."*

As regards the delicate matter of estimating "Intelligence,"

the guiding principle has been not to make any a priori assumptions as to what kind of mental activity may be thus termed with greatest propriety. Provisionally, at any rate, the aim was empirically to examine all the various abilities having any prima facie claims to such title, ascertaining their relations to one another and to other functions.

Four such different kinds of Intelligence have been introduced into the present work. First, there is that revealed in the ordinary classification according to school order (based here upon examinations). This clearly represents *Present Efficiency* in such matters as Latin, Greek, Mathematics, etc. Examples of this kind will be found in experimental series III and IV.

The next sort of Intelligence derives from the same school order, but so modified as to exclude all influence of Age. Such a corrected order may be provisionally accepted as representing, not Proficiency, but *Native Capacity*. It has been arrived at by taking the difference between each boy's rank in school and his rank in age. For obvious reasons, it has been preferred to consider the absolute and not the relative differences; a boy, for instance, who was 20th by examination and 22nd by age would be placed just above one who was 15th by examination and 16th by age, the former being two places and the latter only one better than would have been expected with greatest probability.

The resulting order is clearly but a first approximation, to which we may apply any number of further corrections. For our present purpose, the following has appeared the most that can be practically required (and even this makes no appreciable change in the final values obtained). Evidently, the top boy is prevented from proving his full capabilities by want of competitors; let us suppose that he happens also to be the oldest; then, on our above method, he will seem no better than a boy of middle age and at the same time of middle school order; but the latter will in reality always be found below many younger than himself, compensating this by being also above about an equal number of older ones; now, our top boy has not let himself be surpassed by any single one of his juniors, and therefore would certainly have gone above a great many of his seniors, had the school included such. The top boy's true position may be roughly estimated by making him an extra allowance of a number of places equal to the general mean deviation of actual from average rank (which in this case comes to 5 places); clearly, also, such allowance may with equal right be claimed by the top boy, even if he does not happen to be the oldest; further, the same correction is applicable in slighter degree to the second boy, in still slighter to the third, and so on in a

rapidly diminishing curve up to the centre of the school. For practical purposes, it has seemed sufficient to allow the next four boys, 4, 3, 2, and 1 places respectively; naturally, the whole of this correction must be repeated inversely for the bottom end of the school. Though this explanation is rather complicated, the correction is very easily carried out and, as stated, its effect is hardly appreciable.

The third kind of Intelligence is that represented and measurable by the general impression produced upon other people. This forms the basis of the common broad assortment of the children by their teachers into "*bright*," "*average*," "*dull*" respectively; and with such an assortment I have had to content myself for the elder children in the second series of experiments, while for those under 7 years of age, I have not obtained any intellective grading at all.[1] But for the more important Series I, a list of relative rank was procured of satisfactory completeness. It may here be noted that teachers, if directly asked for such a detailed list, frequently begin by asserting it to be impracticable. It will be generally found, however, that if they be merely requested to pick out the brighest pupil of all, they can do so without any great trouble; and when they are next requested to select the brightest of the remainder, they are still able to perform the desired feat; and so on, until the classification is complete.

The fourth and last sort of Intelligence which has here been estimated is that known as *common sense*. To this end, the oldest of the children of Series I was interviewed and interrogated concerning her comrades in precisely the manner described above, except that the criterion was not to be "brightness at school work" but "sharpness and common sense out of school;" and she seemed to have no great difficulty in forming her judgments concerning the others, having, indeed, known them all her life. As a check, and in order to eliminate undue partialities, it had been arranged that as she left the house, the second oldest child should enter it and thus be able to give an as far as possible independent list, since neither had beforehand had any idea of what was wanted. Finally, a similar list was obtained from the Rector's wife, who also had always lived in this village; but her graduation is unfortunately incomplete and therefore unusable, for she professed inability to pronounce verdict upon some few children who had not come much under her notice; as far as it went, it appeared perfectly homologous with the other two lists.

[1] The day after these experiments I left the neighborhood of the school.

5. *Procedure in Deducing Results.*

(*a*) *Method of Correlation.* So far this chapter has been occupied with obtaining estimates as to the reagents' respective abilities in the several sensory and intellective functions. This is an operation requiring the fullest use of psychological insight; and, therefore, based on the long preliminary investigation previously described, every effort has been made to ferret out and evade all circumstances tending to make our little sample of facts appreciably misrepresentative of the real general relations or psychologically superficial and misleading. But the next portion of our problem is of a very definite objective nature; we wish to ascertain how far the observed ranks in the several abilities tend to correspond with one another; this, it is believed, is no longer a task to be effected by exertions of psychological ingenuity; instead of constructing complex arbitrary tables and plausible but more or less fanciful explanatory stories, we now are in need of such a procedure as will impartially utilize all our information in the *demonstrably most complete manner* and will focus it to a plain quantitative value; for the moment, psychology has to give way to mathematics.

Accordingly, all the more important correlations in the present work have been worked out by the best method hitherto evolved, that of "product moments," as Pearson terms it; only instead of using the actual measurements obtained for the reagents' respective thresholds, the change has been made of employing the numbers denoting their relative ranks; a full explanation of the advantages of this modification may be found in the article specially devoted to the topic (the chief being a reduction of the probable error equivalent to doubling the quantity of cases observed). Merely subsidiary results have often been reckoned by the much more convenient method of "rank differences," while a few correlations were for various reasons not amenable to either of these more exact methods, and therefore had to be worked out by Pearson's auxiliary method or mine of "class averages" (the latter has generally been preferred, on account of its smaller probable error). All these are but different ways of more or less closely arriving at the same measure of correlation, and thus all the results can be freely compared with one another.

The method of "product moments," though sometimes involving lengthy calculations, is so simple in principle that it can be worked by any moderately intelligent schoolboy. Explanation and illustration are given in the above article; here, nothing more than the general formula can be stated, which is as follows:

$$r = \frac{Sxy}{\sqrt{Sx^2.Sy^2}}$$

where x = any individual deviation from the general median as regards one of the compared characteristics,
y = the deviation of the same individual as regards the other characteristic,
Sxy = the sum of such products for all the individuals,
Sx^2 = the sum of the squares of all the various values of x,
Sy^2 = the same for y,
and r = the required correlation.

(*b*) *Elimination of Observational Errors.* This necessitates a further mathematical operation, which, however, is very brief and does not involve anything more than elementary arithmetic. There are two formulæ, one theoretical and the other empirical:

1) $$r_{pq} = \frac{r_{p'q'}}{\sqrt{r_{p'_1p'_2} \cdot r_{q'_1q'_2}}}$$

and 2) $$r_{pq} = \frac{\sqrt[4]{mn} \cdot r_{p''q''} - r_{p'q'}}{\sqrt[4]{mn} - 1}$$

where $r_{p'q'}$ = the mean correlation between the various gradings for p and those for q,
$r_{p'_1p'_2}$ = the average correlation between one and another of these several independently obtained series of values for p,
$r_{q'_1q'_2}$ = the same as regards q,
$r_{p''q''}$ = the correlation of an amalgamated series of measurements for p with an amalgamated series for q,
m and n = the number of independent gradings for p and q respectively,
and r_{pq} = the required real correlation between the true objective values of p and q.

It will be found exceedingly important to employ both formulæ simultaneously, for they are independent of one another and each has different sources of fallacy, so that the most essential information is gained by a comparison between their respective results.

When we say that a series of objects correlates entirely with a second series, we do not assert that every set of measurements of the one will absolutely coincide with those of the other, seeing that discrepancies must inevitably arise from errors in measuring; we only mean that whatever all sets of measurements of the one series have in common with each other will also be found common to all measurements of the other series; then, either of the above formulæ will exactly eliminate the observa-

tional discrepancies and thus present the correlation in its entirety.

But much more often the measurements for the same series are connected with one another by *more* than connects them with the measurements of the other series, and then the case is ambiguous. Either the surplus really lies in the series measured, which is equivalent to saying that this series contains elements not common to the other series and that the correlation is to this extent incomplete; here, once more, both formulæ will produce the properly corrected amount. Or, as is usual, the excess of agreement between the measurements for the same series may partly (or wholly) derive from their having the same constant fallacies; and now it will be found that both formulæ give a correction still in the right direction but too small in quantity; further, this deficiency will be much greater for the theoretical formula than for the empirical one, so that *when both formulæ give the same result, we can assume that the latter has not been appreciably falsified by any constant fallacy common to the several sets of measurements for the same series.*

Under special circumstances, the contrary case may occur of the sets of measurements for the one series being connected with each other by *less* than connects them with those of the other series. This will happen whenever several sets of measurements supposed to be taken from the same lot of objects are really procured from different ones and their several correspondences with the second series have arisen from independent causes. In physical matters, this danger is not serious; if two persons decide independently to measure a fossil cave-bear, they are unlikely to make the mistake of going to different animals. But in psychology it is otherwise; persons may honestly endeavor to appraise the same mental faculty, and yet, owing to diversity of procedure and ignorance of organic uniformities, they may really obtain measurements of quite independent function. In such case, the sets of measurement, however accurate they may be, will show no correspondence with one another; and if the functions are even only partially different, the measurements will correspond with one another to that extent less than they would by reason solely of errors of observation.

The effect will be to falsify any corrections by the theoretical formula, for the latter begins by assuming only one lot of objects to have been measured and therefore the correspondence between the sets of measurements to be at least as great as might be expected from their accuracy—an assumption generally fair enough, but under the special conditions delusively reducing the denominator and thus producing a final value proportionally too large. Now, this same fallacy affects cor

rections by the empirical formula in exactly the opposite direction; for the latter bases itself upon the fact that an amalgamation of several sets of measurements constantly emphasizes whatever elements are common to them all and simultaneously obliterates all that are not common; thus in the normal case of only one lot of objects underlying the sets and determining their correlations to the other series, amalgamation will continually raise the correlation towards its full amount; but if there be more than one underlying lot of objects, each correlating with the other series independently, then amalgamation will not emphasize but obliterate these independent influences and consequently not raise but lower the correlation. Hence, when several functions really corresponding with the second series independently have been confounded together and taken for different measurements of a single correspondence, the results, as corrected by the respective formulæ will sharply diverge. Conversely, if, when a double set of measurements has been made the empirical corrective formula produces an increase of correlation, then these sets of measurements may be regarded as certainly deriving from some single common faculty (any influences specific to each set of measurements being theoretically subtracted from the faculty and viewed as merely so many sources of observational error); and *if the two corrective formulæ lead to the same final amount of correlation, then this latter concerns wholly and solely the common faculty.*

Further, it is of great importance to remark that the last fallacy, namely the case when measurements believed to be taken from the same function really derive from different ones correlating with the other series independently, may, by the first corrective formula, easily come to any values greater than 1 (and therefore impossible, seeing that 1 represents entirety). By the empirical formula, on the other hand, this can never occur; for whether the sets of measurements be connected with one another by either anything more or anything less than connects them with the measurements of any other compared series, then the correspondence between the two series will in both cases be reduced and therefore must necessarily be less than 1;[1] in other words, *the empirically corrected correlation can only amount to full unity when all the sets of measurements for both series have one common element and differ in every other systematic constituent.*

Fuller explanation and illustration are given in the article devoted to the topic of measuring correlation.

(*c*) *Elimination of Irrelevant Factors.* This is the final opera-

[1] Except for deviations due to mere chance, whose range will vary with the probable error.

tion necessary to obtain a true result. Unlike the preceding one, it may often be altogether escaped; for if the conditions are favorable and if the preliminary investigation has been sufficiently thorough, the experiment need not be affected by any irrelevant factor of large enough magnitude sensibly to vitiate the result. Here, also, the necessary mathematical work has been reduced to brief and elementary arithmetic; for more explanation, the reader must again be referred to the special article.

If the irrelevant factor be connected with *only one* of the two compared series, the equation is:

$$r_{pq} = \frac{r'_{pq}}{\sqrt{1 - r^2_{pv}}}$$

where r'_{pq} = the apparent correlation of p and q, the two variants to be compared,

r_{pv} = the correlation of one of the above variants with a third and irrelevantly admitted variant v,

and r_{pq} = the required real correlation between p and q, after compensating for the illegitimate influence of v.

If the irrelevant factor be connected with *both* series compared, the equation becomes:

$$r_{pq} = \frac{r'_{pq} - r_{pv} \cdot r_{qv}}{\sqrt{(1 - r^2_{pv})(1 - r^2_{qv})}}$$

where all the terms have the same meaning as before.

CHAPTER V.

The Present Results.

1. *Method and Meaning of the Demonstration.*

As the reader will have noticed, the formulæ given at the end of the previous chapter are equations whereby from several observed correlations we are able to deduce a single true one. This latter alone is of real scientific significance, and under the ordinary unsystematic conditions — such as governed the great majority of work reviewed in the second chapter — the actually observed correlations will rarely be of much interest in their primitive raw state; for after passing through the proper corrections, they would come forth transfigured in every conceivable manner; some would increase in size, some diminish, some entirely disappear, and some even become inverted. Nevertheless, our true correlation in no way deserves the reproach of being a theoretical abstraction, for it only represents the limit to which the observed correlation itself will continually

approach as improvement is made in the experimental procedure; and not even the most perfect methodics can afford to dispense with the formulæ, seeing that these are the sole means by which the perfection may be adequately ascertained.

Our method of demonstration implies four distinct steps, all of which are believed to be absolutely indispensable for work intending to be more than merely suggestive. First, we must exactly determine the quantity of correlation actually observable, and we must compare it with the probable error; then, if the former be no more than about twice as large as the latter, the whole experiment may indeed have produced a substantial negative result, but cannot possibly warrant any positive conclusion other than to suggest the desirability of extending the investigation until it acquires more evidential value; but if, on the other hand, the observed correlation be four or five times greater than the probable error, we may then consider a *prima facie* case of correspondence to have been established and we may legitimately go on to the corrective processes so as to bring our raw figure to its most probable real amount. Accordingly, the second step will be to form an estimate of the errors in observing the two series compared; for this purpose we must have obtained two or more independent sets of measurements for each series, or at least must be acquainted with the relations found between other such sets under sufficiently similar circumstances; the influence of these errors can then be eliminated by the formulæ given on page 253, and at the same time an opinion can be formed as to the presence or not of the grave fallacies discussed on pages 253 ff. The third proceeding is to look for any factors irrelevantly admitted (or, more rarely, excluded); any suspicions must be carefully verified in succession, and, if necessary, employment must be made of the eliminating equations given on page 256. Finally, we have to critically review the whole argument, paying particular attention to such disturbing factors as have not been disposed of very satisfactorily; in this way we come to a final estimate, not only as to the most probable amount of real correspondence, but also as to the degree of confidence to which our evidence is entitled; for these two things are by no means always parallel, a high apparent correlation often having but small evidential value and *vice versa*.

A few words may now be said concerning the eventual *meaning* attachable to the result which we hope to obtain. To put it briefly, the usual direction of inquiry is in the present work reversed. The customary procedure consists in determining some matter of research subjectively, say, "Perception," "Attention," "Imagination," "Fatigue," etc., and then ascertaining its relation to other similarly pre-determined psy-

choses or neuroses. Here, on the contrary, although every effort has been made to render the mental phenomena as unequivocal and significant as possible, yet in the beginning not the least note is taken of any psychological import beyond such as is barely necessary to define the subject of discussion in the most positive and objective manner; while the structure of language necessitates the continued use of such terms as Discrimination, Faculty, Intelligence, etc., these words must be understood as implying nothing more than a bare unequivocal indication of the factual conditions of experiment. For the moment we are only inquiring how closely the values gained in the several different series coincide with one another, and all our corrections are intended to introduce greater accuracy, not fuller connotation; the subjective problems are wholly reserved for later investigation. It is no new thing thus elaborately to deal with and precisely measure things whose real nature is concealed from view; of this nature, for instance, is obviously the study of electricity, of biology, and indeed of all physical science whatever.

Let us, then, consider the extent of connection between two series of things implied by this sole fact of their presenting a numerical correlation with one another; such a correspondence, when beyond the range of mere chance coincidence, may be forthwith assumed to indicate and measure *something common to* both series in question. Such a community may often consist of a definite so-called "substance;" A's changes of wealth will show some correlation with those of B, if both possess some shares in the same stock. Or, on the other hand, the community may derive from a more complicated interaction of forces; thus, the weather is supposed to correlate with the state of the spots on the sun. But this distinction is superficial even in physical matters; thingness may well be an indispensable crutch for popular thought, and indeed in metaphysics becomes a serious enough topic, but it has no place in strict natural science and still less in psychology, where fast limit has never been securely traceable between things, qualities, and conditions.

But the same simple mathematical formulæ which have brought us so far will take us yet farther. As from several sets of inaccurate measurements it has been found possible to arrive at the accurate correlation of the two real series, so now in a similar manner from any number of real series we can proceed on to dealing exclusively and precisely with any element that may be found common to these series; from ascertaining the inter-correlations of, say, auditory discrimination, visual discrimination, the capacity for learning Greek, and that for playing the piano, we can arrive at estimating the

correspondence of whatever may be common to the first pair of faculties with whatever may be common to the second pair. By combining such correlations of higher order, it is feasible to execute any required amount of elimination and selection, so that eventually a dissociation and exactness may be introduced into psychology such as can only be compared with quantitative chemical analysis; even in the present work, it is hoped to obtain results of sufficient fineness to be independent of local conditions of experiment, and therefore to be precisely verifiable by any other workers. All the time, the relations discovered by us will wholly retain their impartial objective character; however accurately we may learn the distribution of community, it will remain as a later and very different task to detect and analyze its psychical nature. But we shall find that the successive positive ascertainment of objective relations continually reduces and simplifies the thinkable explanatory hypotheses, so that practically our method of investigation is bringing us towards the introspective psychological solution also—and perhaps in the end by the shortest route.

2. *Correspondence between the Discriminations and the Intelligences.*

(*a*) *Experimental Series I.* We will begin by dealing with the subject broadly and considering the general average correlation between the various forms of Discrimination and those of Intelligence. To establish our *prima facie* case, we note that Discrimination has been tested in three senses and that Intelligence has been graded by three different persons; thus we have nine correlations which, if no correspondence exist, should all be small (about half of them under 0.09) and approximately as many should be inverse as direct. Far from this being the case, we find that every single one is direct, that the smallest amounts to 0.25, and that the average comes to 0.38 with a probable error of about only 0.02. Now, a correlation thus more than nineteen times the size of its probable error would not occur by mere accident in millions of trials, so that chance, as a possible cause of the apparent correlations, may at once be put completely out of court. Our result has thus made good its right to further elaboration.

But when we consequently proceed to discount the errors of measurement, it unfortunately becomes clear that our data are far from being adequate for the purpose; we have, indeed, a duplicate set of observations for Common Sense, but none for School Cleverness nor for any of the Sensory Discriminations. The excuse for the deficiency lies to some degree in practical difficulties, but still more in the fact that at the time of the experiments I was only just beginning to realize the necessity of

such duplication. In default, then, of better information, the other errors will provisionally be taken as being about the same size as those for Common Sense (later on we shall have opportunity of partially checking this assumption); on this basis, an elimination of the observational errors by our first or theoretical formula brings the required correlation to 0.60.[1] This result can now be compared with that given by the second formula; for this purpose we utilize the fact that Common Sense and School Cleverness prove to be not very different criteria, so that all three lists may be used as measurements of practically the same intellectual faculty; if we accordingly amalgamate these three lists into one, the latter shows an average correlation with the Discriminations amounting to 0.44 and our required correlation comes to 0.54,[2] or somewhat smaller than by the other way. Such a decrease by the empirical as compared with the theoretical formula could be produced by two causes: either the estimation of School Cleverness might have been more accurate than those for Common Sense, or else there could have occurred the fallacy a priori feared by us, namely that the three critics had been warped by the same prejudices and therefore not able to judge with sufficient independence of one another. As, however, the total divergence only amounts to 0.06, we can conclude that neither of the above disturbances can have existed to any appreciable degree, and we might well ascribe even the small apparent difference to mere chance variation; but to be on the safe side we will adopt the lower value, 0.54.

We next pass to the inquiry into irrelevant factors and will commence with the conspicuous one of Sex. This to all appearance manifests a connection with both Discrimination and Intelligence, and therefore might conceivably be the sole cause of the two latter being congruous with one another. But closer inspection alters the aspect of affairs; for while Sex and Discrimination only show a correlation with one another to the

---

[1] $$\frac{0.38}{\sqrt{0.64 \times 0.6}} = 0.60$$

[2] The two forms of intelligence coincide to the extent of 0.84, so that the equation becomes approximately $$\frac{\sqrt{2+0.84^2} \times 0.44 - 0.38}{\sqrt{2+0.84^2}-1} = 0.54.$$ Even if we neglect the slight discrepancy between the two sorts of intelligence, the result will not be very different, for $\frac{\sqrt{3} \times 0.44 - 0.38}{\sqrt{3}-1} = 0.53$. Note that as we have here an amalgamation for only *one* of the two compared series, we must take the square instead of the fourth root of the number of amalgamated lists.

extent of 0.26 (after correction for errors), they respectively correlate with Intelligence to the amounts of 0.59 and 0.54; so that the true correlation between Sex and Discrimination comes to −0.07,[1] that is to say it entirely disappears. Thus it would seem that the correspondences of Discrimination and Intelligence with Sex are in no degree the causes but merely effects of their correspondence with one another and that *the fluctuating differences of Sensory Discrimination observable in connection with Sex at the various stages of growth are chiefly and perhaps altogether a mere consequence of similarly fluctuating differences in their Intelligence.* This hypothesis tallies well with other indications; in the experiments of Gilbert, for instance, as to the most characteristic discrepancies between boys and girls at the various ages, the two senses tested (visual and muscular) present an almost identical progress, as if both were depending on some common influence. The same conclusion can be more directly derived from the fact that either the boys or the girls, taken separately, present correlational values very similar to the above; but such a subdivision so reduces the number of conjoined cases that the probable error becomes too formidable for the attainment of sufficiently regular results. Hence it has been thought both permissible and advantageous to throw the boys and girls together into the one collective experiment.

The next obvious irrelevant factor is that of Age, which apparently exhibits correlations with Discrimination and Intelligence of 0.37 and 0.42 respectively. But as regards the former, first, the true value obtained in the same way as before descends down to only 0.18,[2] thereby not indeed this time disappearing but still coming almost within reach of some bias in the operation of grading; possibly, then, the connection of Age with Discrimination is at least in the main, like that of Sex, no more than an effect of their common correspondence with Intelligence; this would accord with the strange phenomenon noted above, that Intelligence appears temporarily to diminish about the eleventh year, for precisely the same occurs to their powers of Sensory Discrimination (a fact first pointed out by Gilbert and noticeable in the present experiments also). To turn to the other above indicated correspondence, that between Age and Intelligence, all those who furnished me with their personal estimation of the children's comparative intellect had been particularly requested to do so entirely regardless of Age, and they had anticipated no difficulty on this head declaring

---

1 $$\frac{0.26 - 0.59 \times 0.54}{\sqrt{(1 - 0.59^2)(1 - 0.54^2)}} = -0.07$$

2 $$\frac{0.37 - 0.42 \times 0.54}{\sqrt{(1 - 0.42^2)(1 - 0.54^2)}} = 0.18$$

that their opinions were naturally formed quite independently of any such consideration. But we have seen good reason for being very strict in this respect, and when we actually examine the figures, the observed deviations are often far greater than can be attributed to mere chance; from seven to ten years it is the little ones who are favored and to the large extent of 0.65, which is, however, in this case only three times the abnormally big probable error;[1] but from ten to fourteen the above correlation of 0.42 is found in the opposite direction and upon being corrected only descends to 0.38,[2] which is more than seven times its probable error and therefore would not occur by mere coincidence in many thousand times. Thus we are impelled to believe, either that judgment of Intelligence is to a great though unconscious extent biased by consideration of Age, or else that there is a stage of development somewhere near the eleventh year where Intelligence temporarily declines; in connection herewith we have the curious fact that from about eleven to twelve years there appears to ensue a suspension in the growth of children's heads. Returning finally to our main topics with these two values, 0.18 and 0.38, the corrected correlation between Discrimination and Intelligence now comes to the slightly reduced amount of 0.52.[3]

Passing to the next irrelevant factor, Practice, this influence has in the third chapter shown itself to be only moderate as regards distinguishing Light, and still smaller as concerns Weight; moreover, there is no reason to suppose that the children differed appreciably from one another in their amount of previous practice with these two kinds of activity. But in the matter of Sound all this is reversed, for even the most homogeneous school presents a wide diversity of musical education, and we have already seen that such circumstance is of enormous influence. Taking the quantitative estimates given on page 231, in conjunction with the average and its mean deviation in Table I, the correspondence of Discrimination and Practice can be reckoned out to probably amount in such a school to something like 0.70. This very large factor must therefore be eliminated be-

[1] This result depends upon only one short set of observations; also no detailed rank had been furnished, but merely that favorite but particularly bad classification into "bright," "average," and "dull."

[2] $$\frac{0.42 - 0.54 \times 0.18}{\sqrt{(1 - 0.54^2)(1 - 0.18^2)}} = 0.38$$

This method of correcting three inter-correlated terms in succession beginning with the smallest of them, though far from being theoretically exact, nevertheless appears sufficiently applicable to the large majority of actual cases including the present one.

[3] $$\frac{0.54 - 0.38 \times 0.18}{\sqrt{(1 - 38^2)(1 - 0.18^2)}} = 0.52$$

fore we can hope to obtain an approximately true result. As it only affects Auditory Discrimination, the total average will thereby be finally increased to about 0.58.

So far, we have broadly taken the general average correlation between all the kinds of Discrimination and those of Intelligence. Let us next briefly consider the individual relations between the several specific sensory and intellective faculties. Common Sense and School Cleverness present practically the same amounts, their raw correlations being 0.39 and 0.36 respectively, so that there appears no object in treating these separately. The various sensory departments show apparently much larger discrepancies: for Weight, which has a raw correlation of 0.34, after correction we eventually get 0.43; for Light, with a raw correlation of 0.44, we come to 0.58; and for Sound, with a raw correlation of 0.37, we arrive at no less than 0.71. To this disparity, however, no great evidential value can be attached, until more positive estimates have been obtained as to the errors of measurement; the above rank might really only mean that the accuracy of experimentation had been least in the thresholds for Weight and greatest in those for Pitch.

Lastly comes the process of reviewing the whole argument. Clearly enough, it has in many respects been of a rough character. The arbitrarily assumed observational errors for School Cleverness and for Discrimination were but inadequately checked in the former case and not at all in the latter; while the irrelevant influence of previous practice on Auditory Discrimination was based upon solid but too general data. Also, there is always the danger that other unsuspected irrelevant factors may exist in harmful magnitude; on this head, however, the precautions taken appear fairly adequate; chapter III only shows the results of the preliminary investigation as regards those factors which finally proved most formidable, but a great number of others have been thoroughly examined and their influence has been found to be inappreciable for our present purpose. Among all these sources of inaccuracy, it will be manifest how insignificant is here the rôle of the probable error of the raw main correlation (0.02); thus, though the reagents were only twenty-four in all, it would have been worse than useless to augment their number at the expense of correctness in other respects; for the present, increased precision must be chiefly sought by other means. To sum up, the most likely value for the average correlation between the Discriminations and the Intelligences comes to about 0.58, but this final conclusion must be considered as having a large total probable error, say, 0.10.

(*b*) *Experimental Series II.* On first inspection, the results here would seem diametrically opposed to our last ones, the

correlation turning out to be on the *minus* side, so that Discrimination would appear correlated to the extent of 0.39[1] not with Intelligence but with Stupidity.

But we again notice that both Intelligence and Discrimination are irrelevantly correlated with Age, and to the large amounts of 0.69 and 0.81 respectively.[2] On applying the corrective formula, the true correlation turns round to +0.41,[3] whereby the paradox is readily resolved into a result under the circumstances perfectly normal; we should expect the amount to be smaller than in the former experimental series, because the observational errors must have been greater and have required larger compensation than before, whereas we have given the same.

Thus it is once more evident that the influence of irrelevant factors, though sometimes of moderate magnitude (as in the preceding series) may at other times assume such dimensions as to wholly reverse the conclusion. Nor would such an effect be in the least diminished by increasing the number of reagents experimented upon.

Except for this lesson concerning the danger of irrelevant factors, there is little information to be gleaned from the present series; for while the observed correlation is only —0.25, the probable error comes to no less than 0.18; in other words, such a correlation would turn up about every third time, either when no correspondence existed at all, or when there really was one twice as large. Hence we see that though a short series of cases *may* be managed in such a way that the rôle of the probable error becomes insignificant, yet this is not necessarily so; when the data are gained in the customary unscientific manner, the results of these brief experiments are worthless for persons versed in correlational methodics and delusive for those who are not so.

(*c*) *Experimental Series III.* Here the probable error has been reduced to more reasonable dimensions (0.06 for the average of two correlations); also the disturbances from Sex and Age have been eliminated. But on the other hand (as we have seen on page 248), the sensory tests were so unsatisfactory that the attenuation by errors must be estimated of enormous magnitude. Quite accordingly, the observed correlations of Intelligence with Visual and Tactual Discrimination are no more than 0.13 and 0.12 respectively. Upon this diminutive basis we cannot attempt to pile the very large and vague corrections that would be necessary.

Thus we see that an inadequate way of testing the reagents,

---

[1] The raw correlation is –0.25.

[2] The raw correlations are 0.55 and — 0.65 respectively.

[3] $$\frac{-0.39-0.69\times(-0.81)}{\sqrt{(1-0.69^2)\,(1-0.81^2)}} = +0.41.$$

whether due to circumstances, want of skill, or undue hurry, will so increase the attenuation by errors that the raw observable correlation is brought down to a vanishing minuteness. This effect, so far from being remedied by increasing the range of the experiments and the number of cases, will almost inevitably be augmented thereby.

The principal information to be gleaned from this series is that the correspondence between Discrimination and Intelligence cannot well be appreciably due to Zeal, for the latter faculty had upon this occasion become the paramount differentiating influence.

(*d*) *Experimental Series IV.* On this occasion circumstances were as favorable to accuracy of experimentation (see page 249) as in the last two cases they had been the reverse. Accordingly, we find that Discrimination correlates with Talent in the four branches of study, Classics, French, English, and Mathematics, by an average of 0.51 with a probable error of only 0.03. This proportion of over 17 to 1 is amply sufficient to warrant us in proceeding to determine the real correspondence with considerable precision.

We will again take first the errors of measurement. As regards Intelligence, there was no difficulty in obtaining the required data; for the gradings were based upon the regular school examinations, so that if several of these be taken simultaneously into consideration, each will constitute a sufficiently independent set of measurements. The errors prove much smaller than those in the first experimental series; one examination paper correlates with another in the same branch of study by an average of 0.86; and one total examination correlates with another total examination by an average of 0.95; so that whereas before we had to make a compensation of 24%, we now only require those of 7% and 2%. From this it would appear that examination papers form a test that is far more constant and free from accidental errors of judgment than are teachers' subjective impression as to the "brightness" of their wards; but still this only refers to the reliability of the testing process and does not prejudice the question to be subsequently discussed as to whether the kinds of intelligence tested are different and of unequal value. As concerns the grading of Discrimination, unfortunately the same impediment again frustrated the attainment of several independent sets of observations, so that we once more have no precise measure of compensation; we shall therefore have to make the same free estimate as before. Correcting, then, for both Intelligence and Discrimination, we get a true value of 0.69.[1]

[1] $$\frac{0.51}{\sqrt{0.86 \times 0.64}} = 0.69$$

Proceeding next to irrelevant factors, these appear to have been reduced in the present series to such a minimum that there is no more any necessity for theoretical corrections. The matter of Sex does not again come into the question, since this school is only of boys. Nor is Age this time a disturbant, for its correlation with Discrimination works out to the insensible amount of −0.07. The latter circumstance completely disposes of another possible objection, for it might be urged against Experimental Series I that Age is by no means identical with stage of Growth, some children being more precocious than others, so that our correction to eliminate the former factor does not necessarily suffice to nullify variety in the latter one; hence, it might be argued, the whole correspondence between Intelligence and Discrimination could conceivably be due merely to the brighter children being also more forward with their senses. But though it mnst certainly be admitted that Age and Growth do not always keep level with one another, yet they at any rate correspond to the extent that when the former has ceased to exercise any influence at all the latter also must have become entirely inoperative; and as throughout the school the older boys do not in the least surpass the younger ones in Discrimination of Pitch, we may safely say that their faculty in this respect no longer depends to the smallest degree either on their Age or even on the stage of their Growth.

Still it may be interesting to know what would have occurred had the school lists not been artificially modified, but allowed to retain the factor of Age. In such case, the correlation comes to only 0.45.[1] Thus by eliminating Age we had increased the correlation from 0.45 to 0.69; but to obtain such a rise it can easily be calculated that we must remove an irrelevant factor amounting to about 0.76;[2] now, in the unmodified lists the actual correspondence of Age with Class Order turns out to be precisely this amount. Thus it would appear that *the influence of Age was wholly irrelevant;* not actual Proficiency but Native Capacity is the factor directly correlated with Discrimination; our apparently somewhat theoretical modification of the original school order was no empty abstraction but had after all a solid enough basis in present fact; if with regard to the educational curriculum it merely represented future possibilities, yet in other directions it showed itself to correspond with already efficient powers.

It is now also evident that the whole process of modifying

[1] $$\frac{0.33}{\sqrt{0.86 \times 0.64}} = 0.45$$

[2] $$0.69 = \frac{0.45}{\sqrt{1 - x^2}}, \text{ so that } x = 0.76.$$

the school lists could have been avoided; we could have left them in their raw state and simply have eliminated the irrelevant factor of Age by our usual formula; in this way, indeed, the theoretical precision would have been far greater, for our artificial treatment of the lists is only even approximately correct when Age is a paramount influence in deciding school place, and if applied, say, to university students, would produce an improper decrease (never increase) in the observed correlations; but practically the advantage is generally the other way, as in the present case, for the above theoretical incorrectness is more than compensated by a reduction gained in the probable error, owing to our being able to actually observe more of the correlation and thus leaving less to obtain by calculation.

As regards possible irrelevant correspondence with Practice, the present experimental series is again favorably situated; for though this factor has its usual large influence upon Discrimination of Pitch, there are in this case some positive data wherewith to measure it. Out of the thirty-three children it was ascertained that twenty-two were taking lessons in music, and these not unnaturally showed a much finer Sensitivity (a median of 2.3 v. d. as against one of 5 v. d.). We can therefore reject the eleven not learning music, thus confining the experiment to reagents on nearly the same level as concerns Practice; upon doing so, the correlation makes a further rise to 0.78.[1] Or else we can work out the correlation of Discrimination with Music Lessons, and then remove this irrelevant factor by means of our formula; thereby we arrive at a similar value.

Let us now sum up this fourth series. With respect to the correlations of Discrimination with the School Studies *separately* we have arrived at an average of 0.78, of which figure 0.57 has been actually observed; to this aggregate 0.89 is contributed by Classics, 0.88 by French, 0.73 by English, and 0.61 by Mathematics; here the order may be considered as well enough evidenced, the ambiguity present in the first series having disappeared, since the observational errors have been calculated separately for each study. The correlation of Discrimination with the *Total* School Ability can be calculated with equal ease; the average raw correlation is 0.68, while the successive Total School Orders correlate with one another by 0.95, so that the corrected required correlation becomes 0.87.[2]

In this series we have had the good fortune, not only to ob-

[1] $$\frac{0.57}{\sqrt{0.86 \times 064}} = 0.78$$

$$\frac{0.68}{\sqrt{0.64 \times 0.95}} = 0.87$$

tain reliable estimates of almost all the perturbing influences, but even to eliminate them in practice so that an average of no less than 0.68 can be actually observed. In the further calculation the only value that cannot be approximately relied upon is that of the errors in measuring Discrimination, and even this cannot well be very much smaller than the amount here adopted and, as is subsequently proved, cannot possibly be much larger. The existence of other sources of fallacy yet lurking, either to reduce or to still further augment the total cannot of course ever be categorically disproved; but at any rate a careful search has been made and has so far failed to reveal them. The whole system of results exhibits such regular unconstrained compliance with the definite laws governing correlations (and also present such other remarkable uniformities to be discussed later on) that they appear to offer every guarantee of being perfectly normal.

The correlational value is, however, considerably larger than that found for the same sense in Experimental Series I. The readiest explanation of this discrepancy would appear to lie in a fact which I have often had occasion to notice, namely that when the reagents are very unpractised in any form of sensory Discrimination. the latter correlates with their Intelligence by a much smaller amount.

(*e*) *Conclusions.* On the whole, then, the results of all four experimental series appear sufficiently concordant with one another. Whenever we have succeeded in obtaining a fairly pure correlation between Sensory Discrimination and Life Intelligence, we have found it amount to a very considerable value. In the case of Pitch, it came to as high as 0.87. Very possibly other discriminative functions would show similar results, while some would prove much more specific (and usually dependent on factors peripheral to the nervous system).

3. *Correspondence between General Discrimination and General Intelligence.*

Up to now, we have only discussed the correspondence of the various Intelligences with the various sensory activities, Hearing, Sight, Touch, etc. Such isolated facts are interesting enough, but quite otherwise important is the relation of *any common and essential element in the Intelligences to any common and essential element in the Sensory Functions.* For brevity, we will term these common elements "General Intelligence" and "General Discrimination," but always with the reservations made in the first section of this chapter.

Curiously, this more general correspondence can in the present case be settled with much greater precision than was possible for the specific relations. This is due to our now

having adequate data wherewith to measure the errors of observation, seeing that all the experimentally obtained gradings of specific Discrimination constitute so many one-sided independent attempts to grade the General Discrimination; the amount of observational error will be quantitatively revealed in the correlations between one grading and another.

(*a*) *The Village School.* Here our calculation is as follows. The average of the nine correlations between the Intelligences and the Discriminations comes, as we have seen, to 0.38;[1] the two kinds of intellective gradings correlate with one another by an average of 0.55; and the three gradings in Discrimination do so by 0.25.[2] Therefore by the theoretical formula the true correlation between General Intelligence and General Discrimination comes to

$$\frac{0.38}{\sqrt{0.55 \times 0.25}} = 1.01.$$

Checking this by the second or empirical method, we find that on taking an amalgamation of the three intellective gradings with an amalgamation of the three gradings in Discrimination, the correlation rises to 0.66. Therefore the true correlation between General Intelligence and General Discrimination comes in this way to

$$\frac{\sqrt{3} \times 0.66 - 0.38}{\sqrt{3} - 1} = 1.04$$

This again may be further checked by taking our amalgamation two instead of three lists at a time; in this way we get nine different correlations which present an average of 0.55, so that our required result now becomes 0.96.[3] Therefore an average again gives us as nearly as possible 1.00.

Thus we arrive at the remarkable result that the *common and essential element in the Intelligences wholly coincides with the common and essential element in the Sensory Functions.*

(*b*) *The High Class School.* Here, also, the children were tested in the three senses, but unfortunately, as we have seen, the results for Light and Weight are not seriously usable,[4] so that we no longer have sufficient material for constructing a "General" Discrimination.

---

[1] These correlations are here taken as actual measurements, and therefore are obviously required raw, not corrected; the correction then issues from their joint product according to the formula.

[2] This value is precisely the same as that found for adults: see Table V.

[3]
$$\frac{\sqrt{2} \times 0.55 - 0.38}{\sqrt{2} - 1} = 0.96$$

[4] As far as they go, they indicate results entirely similar to those above.

This default, however, has been made good by what appears to be a very happy substitute. Our main correlations have dealt with reagents all undergoing musical instruction, and I have kindly been furnished with a complete order of their relative abilities in this department. Musical talent has always been recognized as being not so much an intellective as a sensory function; whole nations appear almost devoid of it, without therefore showing themselves any less intelligent; lunatic asylums, on the contrary, often contain a surprising share of the faculty. We will, then, take this as our second sensory function, will note whether it presents any community with Discrimination of Pitch, and if so will compare this common element with that obtaining between the intellective functions. As regards the first point, it may be noted that hitherto very conflicting opinions have been stoutly maintained; the great majority of writers have held Musical Talent and Pitch Discrimination to be very intimately connected and even go so far as to directly term the discriminative power "musical sensitiveness;" while a few, but including perhaps the ablest judges, flatly deny any such correspondence whatever. The actual facts would at first sight seem to lie wholly on the side of the former tenet, seeing that the correlation works out to the substantial amount of 0.40 (or about 0.63, when corrected for errors). Next, these two auditory functions correlate with the Intelligences by 0.57 and 0.55 respectively, and the latter correlate with one another to the amount of 0.71. Thus the relation between the element common to the two former and that common to the four latter will be given by

$$\frac{0.56}{\sqrt{0.40 \times 0.71}} = 1.04$$

We can now check the result by the empirical formula; for we find that the amalgamated order derived from the two sensory faculties correlates with the amalgamated order derived from the four Intelligences by 0.72; so that the required correlation comes to

$$\frac{\sqrt[4]{8} \times 0.72 - 0.56}{\sqrt[4]{8} - 1} = 0.96$$

Taking as usual the mean,[1] we again reach a final correlation of precisely 1.00, and therefore once more must conclude that the element common to the sensory activities also wholly coincides with that common to the intelligences.

[1] If this small difference of value between the theoretical and empirical results be minutely investigated, it can be clearly proved to be solely attributable to mere chance, as indeed might well be expected from its small dimensions.

Before passing, it may be remarked that thus after all those were virtually in the right who maintained Musicality and Pitch Discrimination to have no correspondence with one another; for though a correspondence really does exist, yet it is not to the smallest degree of the specific character contemplated by those who talk of "musical sensitivity." It must here also be noted that this surprising intellectuality of musical talent by no means annihilates the many well-evidenced phenomena seeming to indicate the contrary; one fact cannot destroy another, and any apparent conflict merely proves our imperfect acquaintance with their true nature.

(*c*) *Practical Verification of the Argument.* The conclusion above arrived at is so important and the method of argument is so new, that I have endeavored to reproduce analogous circumstances artificially, so that any one may easily test any portion of the reasoning.

The main argument was repeated as follows. A target was constructed of a great many horizontal bands, numbered from top to bottom. Then a man shot successively at a particular series of numbers in a particular order; clearly, the better the shot, the less numerical difference between any number hit and that aimed at; now, just as the measurement of any object is quite appropriately termed a "shot" at its real value, so, conversely, we may perfectly well consider the series of numbers actually hit in the light of a series of measurements of the numbers aimed at. When the same man again fired at the same series, he thereby obtained a new and independent[1] series of measurements of the same set of objects. Next, a woman had the same number of shots at some set numbers in a similar manner. If, then, our above reasoning and formulæ are correct, it should be possible, by observing the numbers hit and working out their correlations, to ascertain the exact resemblance between the series aimed at by the man and woman respectively. In actual fact, the sets of numbers hit by the man turned out to correlate with those hit by the woman to the extent of 0.52; but it was noted that the man's sets correlated with one another to 0.74, and the woman's sets with one another to 0.36; hence the true correspondence between the set aimed at by the man and that aimed at by the woman was not the raw 0.52, but

$$\frac{0.52}{\sqrt{0.74 \times 0.36}} = 1.00,$$

that is to say, the two persons had fired at exactly the same series of bands, which was really the case. I repeated this ex-

[1] Provided, of course, that there be no appreciable constant error.

periment, testing three times by the first or theoretical formula and four times by the empirical one; by both methods the average came to just upon 1.00, with a mean variation above and below of precisely similar dimensions to those in our instances of Discrimination and Intelligence. Thus the experimental justification of our method of argumentation was as complete as could well be desired.

(*d*) *Conclusion.* On the whole, then, we reach the profoundly important conclusion that *there really exists a something that we may provisionally term "General Sensory Discrimination" and similarly a "General Intelligence," and further that the functional correspondence between these two is not appreciably less than absolute.*

Besides its intrinsic value, such a general theorem has the enormous advantage over the specific results of the last section of being independent of any particular conditions; it has nothing to do with the procedure selected for testing Discrimination and Intelligence, nor even with the accuracy of its execution, nor indeed even with the homogeneousness of the experimental subjects; if correct, the proof should be reproducible in all times, places, and manners—on the sole condition of adequate methodics.

4. *Universal Unity of the Intellective Function.*

In view of this community being discovered between such diverse functions as in-school Cleverness, out-of-school Common Sense, Sensory Discrimination, and Musical Talent, we need scarcely be astonished to continually come upon it no less paramount in other forms of intellectual activity. Always in the present experiments, approximately, $\frac{r_{pq}}{\sqrt{r_{pp} \cdot r_{qq}}} = 1.$[1]

I have actually tested this relation in twelve pairs of such groups taken at random, and have found the average value to be precisely 1.00 for the first two decimal places with a mean deviation of only 0.05. All examination, therefore, in the different sensory, school, or other specific intellectual faculties, may be regarded as so many independently obtained estimates of the one great common Intellective Function.

Though the range of this central Function appears so universal, and that of the specific functions so vanishingly minute, the latter must not be supposed to be altogether non-existent.

[1] Where r_{pq} = the mean of the correlations between the members of the one group p with the members of the other group q,
r_{pp} = the mean of the inter-correlations of the members of the group p among themselves,
and r_{qq} = the same as regards group q.

We can always come upon them eventually, if we sufficiently narrow our field of view and consider branches of activity closely enough resembling one another. When, for instance, in this same preparatory school we take on the one side Latin translation with Latin grammar and on the other side French prose with French dictation, then our formula gives us a new result; for the two Latin studies correlate with the French ones by an average of 0.59, while the former correlate together by 0.66 and the latter by 0.71; so that the element common to the Latin correlates with the element common to the French

$$\text{by } \frac{0.59}{\sqrt{0.66 \times 0.71}} = 0.86 \text{ only.}$$

That is to say, the two common elements by no means coincide completely this time, but only to the extent of 0.86^2 or 74%;[1] so that in the remaining 26%, each pair must possess a community purely specific and unshared by the other pair.[2]

We therefore bring our general theorem to the following form. *Whenever branches of intellectual activity are at all dissimilar, then their correlations with one another appear wholly due to their being all variously saturated with some common fundamental Function (or group of Functions).* This law of the Universal Unity of the Intellective Function is both theoretically and practically so momentous, that it must acquire a much vaster corroborative basis before we can accept it even as a general principle and apart from its inevitable eventual corrections and limitations. Discussion of the *subjective* nature of this great central Function has been excluded from the scope of the present work. But clearly, if it be mental at all, it must inevitably become one of the foundation pillars of any psychological system claiming to accord with actual fact — and the majority of prevalent theories may have a difficulty in reckoning with it.

Of its objective relations, the principal is its unique universality, seeing that it reappears always the same in all the divers forms of intellectual activity tested; whereas the specific factor seems in every instance new and wholly different from that in all the others. As regards amount, next, there seems to be an immense diversity; already in the present examples, the central factor varies from less than 1/5 to over fifteen times the size of the accompanying specific one. But all cases appear equally susceptible of positive and accurate measurement; thus we are becoming able to give a precise arithmetical limitation

[1] The influence of an element is measured by the *square* of its correlational value. See "The Association between Two Things."

[2] Of course this specific community is further resolvable into natural talent and favoring circumstances of which factors the latter may often be paramount.

to the famous assertion that "at bottom, the Great Man is ever the same kind of thing."

Finally, there is the exceedingly significant fact that this central Function, whatever it may be, is hardly anywhere more prominent than in the simple act of discriminating two nearly identical tones; here we find a correlation exceeding 0.90,[1] indicating the central Function to be more than four times larger than all the other influences upon individual differentiation. Not only the psychical content but also the external relations of Sensory Discrimination offer a most valuable simplicity; for it is a single monotonous act, almost independent of age, previous general education, memory, industry, and many other factors that inextricably complicate the other functions. Moreover, the specific element can to a great extent be readily eliminated by varying and combining the kind of test. For these reasons, Discrimination has unrivalled advantages for investigating and diagnosing the central Function.

5. *The Hierarchy of the Intelligences.*

The Theorem of Intellective Unity leads us to consider a corollary proceeding from it logically, testing it critically, and at once indicating some of its important practical uses. This corollary may be termed that of the Hierarchy of the Specific Intelligences.

For if we consider the correspondences between the four branches of school study, a very remarkable uniformity may be observed. English and French, for instance, agree with one another in having a higher correlation with Classics than with Mathematics. Quite similarly, French and Mathematics agree in both having a higher correlation with Classics than with English. And the same will be found to be the case when any other pair is compared with the remainder. The whole thus forms a *perfectly constant Hierarchy* in the following order: Classics, French, English, and Mathematics. This unbroken regularity becomes especially astonishing when we regard the minuteness of the variations involved, for the four branches have average correlations of 0.77, 0.72, 0.70, and 0.67 respectively.

When in the same experimental series we turn to the Discrimination of Pitch, we find its correlations to be of slightly less magnitude (raw) but in precisely the same relative rank, being: 0.66 with Classics, 0.65 with French, 0.54 with English, and 0.45 with Mathematics. Even in the crude correlations furnished by the whole school without excluding the non-musicians, exactly the same order is repeated, though with

[1] See page 276.

the general diminution caused by the impurity: Classics 0.60, French 0.56, English 0.45, and Mathematics 0.39.

Just the same principle governs even Musical Talent, a faculty that is usually set up on a pedestal entirely apart. For it is not only correlated with all the other functions, but once again in precisely the same order: with Classics 0.63, with French 0.57, with English 0.51, with Mathematics 0.51, and with Discrimination 0.40. Ability for music corresponds substantially with Discrimination of tones, but nevertheless not so much as it does with algebra, irregular verbs, etc.[1]

The actual degree of uniformity in this Hierarchy can be most conveniently and summarily judged from the following table of correlation; the values given are those actually observed (theoretical correction would modify the relative order, but in no degree affect the amount of Hierarchy or otherwise). Each number shows the correlation between the faculty vertically above and that horizontally to the left; except in the oblique line italicized, the value always becomes smaller as the eye travels either to the right or downwards.

	Classics.	French.	English.	Mathem.	Discrim.	Music.
Classics,	*0.87*	0.83	0.78	0.70	0.66	0.63
French,	0.83	*0.84*	0,67	0.67	0.65	0.57
English,	0.78	0.67	*0.89*	0.64	0.54	0.51
Mathem.,	0.70	0.67	0.64	*0.88*	0.45	0.51
Discrim.,	0.66	0.65	0.54	0.45		0.40
Music,	0.63	0.57	0.51	0.51	0.40	

Altogether, we have a uniformity that is very nearly perfect and far surpasses the conceivable limits of chance coincidence. When we consider that the probable error varies between about 0.01 for the ordinary studies to about 0.03 for music, it is only surprising that the deviations are not greater. The general Hierarchy becomes even more striking when compared with

[1]Of course, notable instances will easily be found where musical ability is apparently divorced from General Intelligence; in this very school, for example, the best musician is far from standing high intellectually. But not even the most extreme cases necessarily contravene the above rule. A correlation does not state any absolute coincidence between two faculties, but only a limited and precisely measured tendency in this direction; so far from excluding deviations, it proclaims them and even estimates their exact probability. If we may assume the normal law of frequency to approximately hold good and may abstract from further influences, then the proportion of persons with any given amount of musical talent who will attain to any given degree of stupidity (or *vice versa*)

$$= \frac{1}{2} - \frac{1}{\sqrt{\pi}} \int_{0}^{ah} e^{-t^2} dt$$

where h is a measure of the correlation between Musicality and Intelligence, and a = the given inferiority in the latter faculty.

the oblique line, which is no measure of the central Function and where consequently the gradation abruptly and entirely vanishes.[1]

The above correlations are raw, and therefore do not tell us either the true rank of the respective activities or the full absolute saturation of each with General Intelligence. For the former purpose we must eliminate the observational errors, and for the latter our result must further be *squared*.[2] Thus we get:

Activity.	Correlation with Gen. Intell.	Ratio of the common factor to the specific factor.
Classics,	0.99	99 to 1
Common Sense,	0.98	96 4
Pitch Dis.,	0.94	89 11
French,	0.92	84 16
Cleverness,[3]	0.90	81 19
English,	0.90	81 19
Mathematics,[4]	0.86	74 26
Pitch Dis. among the uncultured,[5]	0.72	52 48
Music,	0.70	49 51
Light Dis.,[5]	0.57	32 68
Weight Dis.,[5]	0.44	19 81

It is clear how much the amount of any observable raw correlation depends upon the two very different influences: first, there is the above intellective saturation, or extent to which the considered faculty is functionally identical with General Intelligence; and secondly, there is the accuracy with which we have estimated the faculty. As regards the ordinary school

[1] The only other data of this kind with which I am acquainted are some comparisons made between the different branches of study at the Columbia University in the course of the research quoted on page 218. The correlations there obtained, which were throughout somewhat smaller than the above, manifest only a limited concordance with our above principle of Hierarchy. But a university is clearly not the place in which to look for natural correspondence between functions; at that time of life, strong ties of a wholly artificial sort have intervened; each student singles out for himself that particular group of studies tending to his main purpose and devotes to them the most judicious amounts of relative energy. To determine natural correlations, we must go to where the pupils meet each other in every department on relatively equal terms.

[2] See note to page 273.

[3] Here so termed for brevity; really that quality is meant which causes a person to be regarded by his teachers as "clever."

[4] The opposite and more usual view, namely, that mathematics form an entirely independent faculty, will be found expounded in 331 pages "Ueber die Anlage zur Mathematik" by the well-known psychiatrist, Möbius. Similar evidence is brought by him to the effect that this talent is proportional to the development of the upper outer orbit of the eye, especially the left.

[5] As has been before mentioned, the rank of these three faculties remains ambiguous until their observational errors have been ascertained.

studies, this accuracy is indicated by the oblique italicized line, and therefore appears about equal in all cases (not in the least following the direction of the Hierarchy); but in other cases there is a large divergence on this head, which leads to important practical consequences. Mathematics, for example, has a saturation of 74 and Common Sense has one of about 96; but in actual use the worth of these indications becomes reversed, so that a subjective impression as to a child's "brightness" is a less reliable sign than the latter's rank in the arithmetic class; almost as good as either appears a few minutes' test with a monochord.

In the above Hierarchy one of the most noticeable features is the high position of languages; to myself, at any rate, it was no small surprise to find Classics and even French placed unequivocally above English (note that this term does not refer to any study of the native tongue, but merely to the aggregate of all the lessons conducted therein, such as History, Geography, Dictation, Scripture, and Repetition).

However it may be with these or any other special facts, here would seem to lie the long wanted general rational basis for public examinations. Instead of continuing ineffectively to protest that high marks in Greek syntax are no test as to the capacity of men to command troops or to administer provinces, we shall at last actually determine the precise accuracy of the various means of measuring General Intelligence, and then we shall in an equally positive objective manner ascertain the exact relative importance of this General Intelligence as compared with the other characteristics desirable for the particular post which the candidate is to assume (such as any required Specific Intelligences, also Instruction, Force of Will, Physical Constitution, Honesty, Zeal, etc.; though some of these factors cannot easily be estimated separately, there is no insuperable obstacle to weighing their *total influence* as compared with General Intelligence). Thus, it is to be hoped, we shall eventually reach our pedagogical conclusions, not by easy subjective theories, nor by the insignificant range of personal experiences, nor yet by some catchpenny exceptional cases, but rather by an adequately representative array of established facts.

6. *Outer Factors Determining the Amount of Correlation.*

The values given in the preceding section show the correlations found for various specific activities. These amounts, however, are not wholly constant; the apparent or raw correlations, as we have abundantly seen, deviate in every direction, depending almost entirely upon the number and kind of impurities suffered to enter and vitiate them; but even the true corrected correlation appears to admit of no inconsiderable variation,

according to the conditions of experiment. Generally speaking, the amount seems to be always greater in proportion as the reagents are enabled to *manifest their finest powers;* nor is such factor readily resolvable into the greater regularity thereby obtained. It is especially conspicuous in the following phenomena:

The correlation is augmented when Discrimination is calculated according to the reagents' acutest perception under the most favorable circumstances, rather than according to their freedom from accidental slips.[1] The correlation is larger when all the reagents have the function in question well developed, either by general habit or by careful fore-exercise, than when all are in a comparatively backward stage.[2] So far, this increase has only manifested itself for the lower grades of practice; it might conceivably be reversed, on approaching the higher grades of special training.

The correlation increases, when the conditions of examination are such as least to distract or puzzle the reagent.

The other factor appearing at all likely to determine the amount of correlation is Age. Within the narrow range of most of our experiments, however, namely from nine to fourteen years, this influence is not apparent. To measure exactly any such change, correlations have been calculated of a secondary order, that is, between the above correspondence on the one hand and Age on the other; even among the village children, who are still in the process of developing their sensory acuteness, this correlation of secondary order only amounts to −0.15, thus indicating that the correspondence between Discrimination and Intellect is almost as great among the older children as among the younger ones. For the boys of the preparatory school, who have already reached their full sensory powers, this secondary correlation comes to −0.07, testifying that the above correspondence is as nearly as possible uniform throughout the different ages. Finally we have seen evidence that this correspondence is the cause of the correspondence between one kind of Discrimination and another, and the latter has proved of exactly the same value for adults as for children (0.25 raw).

It must, however, be mentioned that the opinion has been arrived at and stoutly defended by Wissler, that any corre-

[1] This seems to indicate an opposition between the sensory acuteness due to Intelligence and that arising from Practice. This, again, would evidently conflict with Fechner's principle of measuring the sensory threshold by means of Gauss' formula.

[2] It must be mentioned that Binet has arrived at the contrary conclusion, namely that correlations with Intelligence are only observable on first trial and almost disappear when the reagents are again tested. See L'année psychologique, Vol. VI.

spondence between Intelligence and Mental Tests can only exist among young children and must disappear with advancing adolescence. He bases his view firstly upon the fact that his Columbia experiments with University students show no appreciable correlations of this nature; this argument will be dealt with in the next section, criticising these same experiments. And secondly, he truly enough remarks that even the correlations found by Gilbert in children from six years upwards are no longer evident in their seventeenth and eighteenth years. But Wissler does not seem to have been able to measure these correlations of Gilbert quantitatively, the latter not having furnished the data required for the standard formula; they may, however, easily be reckoned by means of the method of "class averages;"[1] they will then be seen to be all very irregular and throughout in dangerous proximity to the amount of the probable error; though the seventeenth and eighteenth years do indeed show little correspondence, yet the sixteenth year exhibits the very highest of all while the twelfth year has the lowest; as regards the *general* tendency of these correlations, it is really if anything to *increase* with Age (such tendency only amounts to 0.15 ± 0.08 and therefore is probably a mere chance).

7. *Previous Researches Conflicting with the Present Results.*

The great bulk of past experiments do not admit of direct comparison with the present ones; for while the latter have been expressly confined to the most elementary forms of laboratory procedure, the former have continually striven to cover vast territory so as to summarily exhaust the whole problem. These more ambitious researches, therefore, can only be criticised in the general manner attempted in Chapter II.

But three investigations—luckily such as to represent the best work accomplished in this department—have also included our present topic, simple Sensory Discrimination. These three will now be discussed in more detail.

Gilbert. The first is that of J. Gilbert, whose valuable and already frequently mentioned experiments upon over 1,000 school children in 1893 included an inquiry into "muscle sense" and "color differences." The apparatus for the former, as for my own, consisted in a number of small boxes which looked and felt exactly similar but were really a set of finely graduated weights. Also his "color differences" were very analogous to my sight tests, for both utilized a series of objects each slightly darker than the preceding one and both were executed by day-

[1] See "The Association between Two Things." This *Journal*, XV, 1904, pp. 72-101.

light.[1] His grading of "mental ability" lay in the usual classification of the children by their respective masters into "bright," "average," and "dull."

As regards his results, Gilbert is perhaps the most conspicuous among those investigators who *do* find an appreciable correspondence between "mental tests" and "general ability." Concerning the above two Sensory Discriminations, he unfortunately confines himself to the following indirect information: "The curves for reaction-time gave the most positive results showing that the brighter the child the more quickly he is able to act. *In discrimination the same relation is noticeable but to a less degree.*"[2] Thus we are referred on to the correlation for reaction-time, which is everywhere emphasized. "The difference between the reaction-time of those who were bright, of average mental ability and dull respectively" becomes "very noticeable." Again, "the bright children react much more quickly than the dull," and "it is shown here that we judge of a child's mental ability by the quickness or rapidity with which they were able to act." Though Gilbert contents himself with these utterances of rather vague character, he here carefully furnishes most of the essential data for more precise conclusions; he tells us the average reaction-time of "bright," "average," and "dull" for each of the twelve years tested; also he gives us all the mean variations.

With this knowledge, we are easily enabled to work out the exact correlation for ourselves,[3] and are surprised to find that it after all averages no more than 0.19 ($\pm$ 0.04).[4] The correlation of general ability with sensory discrimination, being even less noticeable, must indeed be minute.

To explain this low figure we must note that from the described mode of procedure the conditions would seem to have here been at least as unfavorable as they were in the present Series III. In confirmation of this view, it may be seen that

[1] This similarity of apparatus by no means implies any proportional similarity in mode of proceeding.

[2] Studies Yale Psych. Lab., II, p. 94. The italics are mine.

[3] By the method of "class averages."

[4] Here we have an illustrative instance of operating with large numbers of cases. This correlation of Gilbert was based upon an examination of no less than some 1,100 children; therewith we may compare the chief correlation in the present Series IV based on examination of only 22. To the layman, the latter result would seem the immensely more exposed of the two to the danger of being a mere chance coincidence. But when the matter is worked out precisely according to the true and established laws of chance, a correlation like that found by Gilbert, being less than four times its probable error, would occur by mere accident about once in 200 times; whereas the correlation in Series IV, being over twenty times its probable error, would not so occur in millions upon millions.

the average threshold found by Gilbert for discrimination of weight is as coarse as 1/11, whereas even that in Series III comes to 1/15 and the more carefully executed Series I shows 1/20. The natural consequence would necessarily have been to produce a similar attenuation by inadequate representativeness and therefore a similarly small correlation as in that series. Moreover, such an effect would have been materially enhanced by the heterogeneity of Gilbert's reagents, which must inevitably have introduced serious irrelevant correlation. If these considerations be justified, his observed correlations must be taken as being very much smaller than the true ones would have been.

Seashore. The next results to be criticised are those of Seashore, which include an important investigation into the same Pitch Discrimination with which our own experiments have been so much occupied. Seashore, as we have seen, comes to the resolutely negative conclusion "*that there is no functional relation*[1] between any one of these (mental tests) and general mental ability."

To support this verdict in the case of Pitch, he draws up the following table, remarking, "the distribution of the results practically coincides with the most probable distribution according to chance, which is indicated in the parentheses."

General Mental Ability.

		I	II	III	IV	V
Discriminative Sensibility for Pitch.	I	5 (5)	8 (6)	3 (7)	5 (4)	1 (1)
	II	16 (14)	18 (16)	18 (17)	7 (10)	2 (3)
	III	6 (8)	7 (10)	15 (10)	5 (6)	3 (2)
	IV	6 (7)	7 (8)	8 (9)	8 (5)	2 (1)
	V	4 (3)	3 (3)	3 (4)	2 (2)	1 (1)

But this ingenious mode of calculating correlation is of a somewhat disseminated nature, and one may be pardoned for thinking it hardly adapted for giving very accurate results. If, instead of trying to consider fifty amounts all at the same time, we sum them up a little and compare averages we shall find after all a fairly definite tendency for the higher ability to be also accompanied by higher place in Discrimination. If we desire a still more unified and really usable result, we can easily obtain it by any of Pearson's or my auxiliary method;[2] it works out by Pearson's method to 0.24 (±0.07). Thus here, where functional relation has been so categorically denied, it is in reality greater than in Gilbert's reaction-times where it was held up as being so complete.

[1] The italics are Seashore's.

[2] Seashore's data are not sufficient for us to apply the standard formula.

But this value, though plain and positive enough, must nevertheless be admitted to be somewhat small as compared with that in my own experiments. Nor can this be altogether explained in precisely the same way as in the last example, for here the method of procedure seems to have been much more deliberate; the experimentation was skillfully designed, and the seven minutes allowed to each reagent was perhaps sufficient for its proper execution, though about a quarter of an hour appears to me better. But when we consider the composition of the sample of persons experimented upon, we come upon an irrelevant correlation of great magnitude; for we find that though Seashore remarks a great discrepancy between the children under and over ten years of age, yet he throws them all together into the same correlation and thus introduces an irrelevant connection with Age which comes to no less than 0.73 (reckoned again by Pearson's auxiliary method). This irrelevancy has evidently just the same effect, whether it be really due to difference of age; or, as I have suggested, partly to disparity of culture; or even, as Seashore himself supposes, to imperfection of experimentation. In all cases alike, the real correlation comes to about 0.35,[1] which is almost exactly the same result as obtained in my own Series I before allowing for further errors.[2]

Columbia. We now pass to the third and last series of experiments bearing on our particular question. This is the very extensive and in many respects important one that has been continuously conducted at Columbia University for the past ten years. For our present purpose, it includes "Perception of Weight" and "Perception of Pitch," while an intellectual grading is obtained from the students' average standing in the various university courses.

Again the general conclusion is an unqualified negative, reading as follows:

"The markings of the students in college classes correlate with themselves to a considerable degree, but not with those made in the laboratory."

Here our critical review is rendered much simpler by the correlations having been properly calculated and plainly stated. Wissler's statement is fully borne out by the values quoted,

---

[1] $$\frac{0.24}{\sqrt{1 - 0.73^2}} = 0.35$$

[2] Once more Dr. Seashore has an easy opportunity of practically testing these theoretically gained conclusions concerning this work; if he will exclude the disparate cases under ten years of age, and still more if he will then confine his consideration to such as have learnt music, he will be able definitely to ascertain whether or not the correspondence does not thereupon become very apparent.

the average correlation of the tests with Intelligence being only 0.06 and that of the tests among themselves being 0.09, thus in neither case much exceeding the size of the probable error, though the great majority of instances are at any rate positive. The amount for Perception of Weight is unfortunately not given, but that for Perception of Pitch comes to 0.16.

Above we have seen that Wissler would account for this minuteness of correspondence by the greater age of the students as compared with the children usually experimented upon. But so far our available evidence is not at all that correspondence diminishes with age, but rather that it is completely independent thereof. Moreover there does not appear any urgent need of introducing such a factor, seeing that perhaps sufficient explanation is forthcoming otherwise. To begin with, university students are not exactly the average from the schools but more or less a selection of the most able; hence they intellectively form a more homogeneous class, so that all their intellective correlations will be somewhat reduced in amount. More serious, probably, is the fact that the test of Discrimination has here been so impurified by alien elements, that even Wissler himself prefers to call it a test of Memory.

But perhaps the chief source of the lowness of the correlations will be found in the following circumstances, namely: that the subjects were examined three at a time, each being managed by some "student or officer of the department;" that no less than twenty-two different tests were carried out, many of a most difficult character, besides measuring the length and breadth of each reagent's head; that during the leisure moments afforded him in the course of these tests the observing "student or officer of the department" had to note in writing the contour of the reagent's forehead, the character of his hair, the nature of his complexion, the color of his eyes, the shape of his nose, the description of his ears, of his lips, of his hands, of his fingers, of his face, and of his head—and that this whole procedure is considered to be satisfactorily completed in forty-five minutes.

On the whole, then, the apparent conflict of previous researches with the present ones does not appear fundamental or such as in any way to invalidate the evidence now produced.

8. *Summary of Conclusions.*

To conclude, the following is a brief summary of the principal conclusions indicated by the foregoing experiments:

I. The results hitherto obtained in respect of psychic correlation would, if true, be almost fatal to experimental psychology as a profitable branch of science. But none of these results, as at present standing, can be considered to possess any

value other than suggestive only; this fact is not so much due to individual shortcomings of the investigators, as to the general non-existence of any adequate system of investigation.

II. On making good this methodological deficiency, there is found to actually occur a correspondence—continually varying in size according to the experimental conditions—between all the forms of Sensory Discrimination and the more complicated Intellectual Activities of practical life.

III. By this same new system of methodics, there is also shown to exist a correspondence between what may provisionally be called "General Discrimination" and "General Intelligence" which works out with great approximation[1] to *one or absoluteness*. Unlike the result quoted in the preceding paragraph, this phenomenon appears independent of the particular experimental circumstances; it has nothing to do with the procedure selected for testing either Discrimination or Intelligence, nor with the true representativeness of the values obtained by these tests, nor even with the homogeneousness of the experimental reagents; if the thesis be correct, its proof should be reproducible in all times, places, and manners—on the sole condition of adequate methodics.

IV. The above and other analogous observed facts indicate *that all branches of intellectual activity have in common one fundamental function (or group of functions), whereas the remaining or specific elements of the activity seem in every case to be wholly different from that in all the others.* The relative influence of the general to the specific function varies in the ten departments here investigated from 15:1 to 1:4.

V. As an important practical consequence of this universal Unity of the Intellectual Function, the various actual forms of mental activity constitute a stably interconnected Hierarchy according to their different degrees of intellective saturation. Hence, the value of any method of examination as to intellectual fitness for any given post is capable of being precisely ascertained, since it depends upon:

(a) the accuracy with which it can be conducted;
(b) the hierarchical intellective rank of the test;
(c) the hierarchical intellective rank of the duties involved in the post.

Methods have been given whereby all these three points can be sufficiently ascertained.

VI. Discussion as to the psychical nature of this fundamental Function has been reserved until a more complete acquaintance has been gained concerning its objective relations. Among the latter, the principal and determining one is its

[1] In the present experiments, as far as the second decimal place.

unique position as indicated in paragraph IV. The chief further evidence is to the following effect:

The function appears to become fully developed in children by about their ninth year, and possibly even much earlier. From this moment, there normally occurs no further change even into extreme old age.

In adult life, there would seem no appreciable difference between the two sexes.

The Function almost entirely controls the relative position of children at school (after making due allowance for difference of age), and is nine parts out of ten responsible for success in such a simple act as Discrimination of Pitch.

Its relation to the intellectual activity does not appear to be of any loosely connected or auxiliary character (such as willingness to make an effort, readiness in adaptation to unfamiliar tests, or dexterity in the fashion of executing them), but rather to be intimately bound up in the very essence of the process.[1]

APPENDIX.

Experimental Series I.

Village School, 24 Oldest Children.

A. Original Data.

Sex.	Age.		Discriminative Threshold.			Intellectual Rank.		
			Pitch	Light	Weight	Common Sense out of School.		Cleverness in School.
	Years	Months	1/3 v. d.	1:200	1:200	(A)	(B)	
f	11	6	8	4	4	6	5	2
m	12	11	15	3	4	11	7	22
f	12	8	14	6	4	16	10	7
f	13	8	13	4	9	1	1	1
m	11	4	5	14	7	3	2	3
f	11	11	25	7	4	10	14	9
f	11	3	10	19	8	8	19	12
f	13	1	10	12	10	2	4	6
m	12	5	18	11	9	5	6	11
m	12	7	14	30	7	21	22	19
f	12	8	60	3	10	12	9	4
f	13	10	20	12	10	13	12	18
f	13	1	40	5	12	4	8	8
f	12	1	45	12	9	9	13	14
f	10	6	33	5	15	15	18	10
m	11	5	25	4	28	17	11	17
m	10	0	90	15	5	22	21	5
f	11	9	17	15	20	14	20	15
m	13	7	24	26	13	19	17	24
m	12	6	18	35	14	18	3	6
m	10	4	70	10	14	23	24	20
m	11	7	17	42	16	24	23	23
f	11	2	28	20	17	7	15	13
m	11	2	90	25	18	20	16	21

EXPERIMENTAL SERIES I.

Village School, 24 Oldest Children.

B. Calculated Correlations.

Description.		Amounts.		
First Term *versus* Second Term.		Raw.	Prob. Err.	Corrected.
Sound Discrim.	Common Sense (A)	+0.44	0.07	}
" "	" " (B)	+0.41	0.07	} +0.71
" "	School Cleverness	+0.25	0.09	}
Light "	Common Sense (A)	+0.42	0.07	}
" "	" " (B)	+0.44	0.07	} +0.58
" "	School Cleverness	+0.47	0.06	}
Weight "	Common Sense (A)	+0.38	0.07	}
" "	" " (B)	+0.27	0.08	} +0.43
" "	School Cleverness	+0.37	0.07	}
Com. Sense (A)	Common Sense (B)	+0.64	0.05	
Common Sense	School Clever. Av.	+0.55	0.04	+0.86
Discrimination	Discrimination "	+0.25	0.05	+0.39
"	Intelligence "	+0.38	0.02	+0.86
"	Amal. Intell. "	+0.66	0.04	
"	Sex "	+0.21*	0.09	+0.00
Sex	Intelligence "	+0.47*	0.06	+0.59
Age	Sound Discrim.	+0.41	0.07	}
"	Light Discrim.	+0.30	0.07	} +0.18
"	Weight Discrim.	+0.20	0.09	}
"	Intelligence Av.	+0.34	0.05	+0.38
"	Corr. Discrim.-Intell.	+0.15	0.09	+0.00
General Intell.	Pitch Discrim.			+0.72
"	Light "			+0.57
"	Weight "			+0.44
"	Common Sense			+0.98
"	School Cleverness			+0.90
"	General Discrim.			+1.00 (p. e. about 0.02)

The probable error may be taken at about 0.10

*These two correlations have had to be calculated by an auxiliary method, the standard formula not being applicable; hence, the probable error is considerably larger than it would otherwise have been.

Experimental Series II.

Same Village School, 36 next Oldest Children.

A. Original Data.

Sex.	Age.		Pitch.	Intellectual Class estimated by Schoolmaster.
m	9	7	6	2
m	8	7	6	2
f	7	3	16	1
m	8	0	24	2
f	8	0	26	2
m	8	4	35	2
m	9	9	35	3
m	8	2	38	1
m	9	0	42	3
f	7	11	48	2
f	8	2	48	2
f	7	2	67	1
f	9	11	67	3
*f	5	8	70	
*m	5	7	74	
m	10	2	74	2
*m	7	0	77	
f	7	1	77	1
*f	6	9	80	
m	9	6	80	3
m	7	10	96	1
m	8	2	96	2
*m	6	7	104	
*f	6	10	112	
m	7	11	112	2
*m	5	6	120	
*m	5	11	120	
*m	6	6	120	
*m	6	5	> 120	
f	7	0	> 120	1
*f	6	5	> 120	
*m	6	1	> 120	
m	7	3	> 120	1
*m	5	6	> 120	
*m	6	6	> 120	

Those marked with a star are in the infant school; their relative intellectual rank has not been ascertained, and therefore they are not included in the correlations below. Their average threshold is about 40 v. d., or more than double that of the remainder.

B. Calculated Correlations.

Description.			Amounts.		
First Term	*versus*	Second Term.	Raw.	Prob.Err.	Corrected.
Pitch Discrim.		Intellectual Class	−0.25	0.18	+0.41
Age		Pitch Discrim.	+0.55	0.18	+0.69
"		Intellectual Class	−0.65	0.18	−0.81

EXPERIMENTAL SERIES III.

High Class Preparatory School for Boys.

A. Original Data.

Age.		Discriminative Threshold.			Place in School (*before modification to eliminate Age*).			
		Pitch From Ex. Ser. IV.	Light 1:200	Weight 1:200	Classics	French	English	Mathem.
10	9	50	10	4	16	19	10	7
12	4	3	10	6	5	6	6	5
11	1	10	10	9	13	11	11	13
10	11	> 60	10	9	22	23	22	22
13	7	4	12	5	1	1	1	2
12	6	2	10	10	4	2	2	1
10	4	4	10	11	12	14	13	18
9	5	20	10	11	23	22	23	23
12	0	11	10	12	8	8	15	15
10	2	11	12	11	3	5	4	4
11	2	24	14	10	7	7	7	6
10	1	5	18	7	20	15	18	16
9	8	3	18	9	10	13	14	12
11	10	5	13	13	2	3	3	3
11	1	6	13	13	11	12	12	9
10	6	7	14	11	17	18	17	13
10	8	15	19	10	21	20	21	19
10	4	11	14	13	19	21	9	21
10	4	14	13	18	18	16	8	17
10	1	15	13	28	15	10	20	10
12	3	7	19	13	9	9	16	11
10	7	4	16	16	14	17	19	20
13	7	> 60	19	27	6	4	5	8

B. Calculated Correlations.

Description.			Amounts.	
First Term.	*versus*	Second Term.	Raw.	Prob. Error.
Amal. School Place*		Light Discrimination	+0.13	0.09
" " "		Weight "	+0.12	0.09
" " "		Amal. Light and Weight	+0.19	0.06
Weight Discrim.		Light Discrim.	+0.32	0.08
Pitch "		Weight "	+0.16	0.09
" "		Light "	+0.13	0.09
Age "		Weight "	+0.09	0.09
" "		Light "	+0.14	0.09

*Modified to eliminate age.

Experimental Series IV.

High Class Preparatory School for Boys.

A. Original Data.

Age		Pitch	Place in School (*before modification to eliminate Age*).												Music
			Classics			French			English			Mathem.			
Years	Months	Discrim. Thres. in ½ v. d., October, 1902	Xmas, 1902	Easter, 1903	July, 1903	Xmas, 1902	Easter, 1903	July, 1903	Xmas, 1902	Easter, 1903	July, 1903	Xmas, 1902	Easter, 1903	July, 1903	Ranked by Music Master
12	6	2	8	7	4	5	3	3	4	3	3	4	2	3	8
12	4	3	11	12	10	13	13	10	13	13	11	12	13	11	9
9	8	3	19	18	15	21	19	16	23	21	18	21	19	17	6
13	7	4	2	2	1	2	2	1	2	2	1	7	7	7	3
10	4	4	21		19	22		23	22		20	21		24	16
10	7	4	23	23	22	26	23	22	28	25	23	29	25	23	1
13	6	5	3			3			3			3			21
11	10	5	6	4	3	7	6	5	6	6	2	9	8	6	
10	1	5	29	26	24	23	25	21	27	26	22	25	23	19	7
11	1	6	20	20	18	20	21	18	21	20	19	17	16	15	14
13	4	7	1	1		1	1		1	1		1	1		5
10	6	7	26	24	21	27	16	13	26	19	17	22	18	16	11
12	3	7	18	17	16	17	20	19	25	23	21	19	17	14	20
13	1	8	5	5	5	4	4	2	5	8	5	5	4	1	4
11	1	10	22	19	17	19	18	17	20	17	15	23	21	21	18
9	9	10	33	29	27	33	29	27	33	27	27	32	29	27	17
10	4	11	28	25	23	30	27	24	18	18	13	30	27	22	
13	0	11	4	3	2	6	5	4	7	4	4	2	3	4	
10	2	11	7	6	6	12	7	6	8	5	8	11	9	8	
13	0	11	12	11	11	11	11	12	15	16	16	6	5	2	12
12	0	11	17	16		16	15		24	22		24	24		15
12	11	12	9	8	7	8	8	7	9	7	7	14	12	12	
13	1	14	10	9	8	10	9	8	11	10	9	10	10	9	13
10	4	14	27	21	14	24	22	15	17	11	10	26	20	18	2
10	1	15	24	22	20	18	17	14	29	24	24	18	15	13	
12	6	15	14	13	12	15	14	11	10	9	6	8	6	5	10
10	8	15	30	27		29	26		30	29		28	26		
12	8	18	16	15	13	25	24	20	14	14	12	20	21	20	19
9	5	20	32		25	31		25	32		26	33		26	
11	2	24	15	14	9	14	12	9	16	15	14	13	11	10	
10	9	50	25			28			19			15			
10	11	> 60	31	28	26	32	28	26	31	28	25	31	28	25	22
13	7	> 60	13	10		9	10		12	12		16	14		

EXPERIMENTAL SERIES IV.

High Class Preparatory School for Boys.

B. Calculated Correlations.

Description.				Amounts.		
First Term	*versus*	Second Term		Raw	Prb. Err.	Corrected
Pitch Discrimination		Av. School Place (unmodified)		+0.33	0.04	+0.45
" "		Classics (modified to eliminate age)	Av.	+0.60	0.02	
" "		French " " " "	"	+0.56	0.03	
" "		English " " " "	"	+0.45	0.03	
" "		Mathematics " " " "	"	+0.39	0.03	
" "		Classics (musicians only)[1]	"	+0.66	0.03	+0.89
" "		French " "	"	+0.65	0.03	+0.88
" "		English " "	"	+0.54	0.03	+0.73
" "		Mathematics " "	"	+0.45	0.03	+0.61
" "		Amal. School Place (musicians only)	"	+0.68	0.01	+0.87
Classics		Classics	"	+0.87	0.01	
French		French	"	+0.84	0.01	
English		English	"	+0.89	0.01	
Mathematics		Mathematics	"	+0.88	0.01	
Amal. School Place		Amal. School Place	"	+0.95	0.01	
Classics		French	"	+0.83	0.01	+0.96
"		English	"	+0.78	0.01	+0.91
"		Mathematics	"	+0.70	0.01	+0.81
French		English	"	+0.67	0.01	+0.78
"		Mathematics	"	+0.67	0.01	+0.78
English		Mathematics	"	+0.64	0.01	+0.74
Age		Amal. School Place (unmodified)	"	+0.76	0.02	+0.78
"		" " " (modified)		+0.05	0.05	
"		Pitch Discrim.		−0.07	0.08	+0.00
"		Corr. Discrim.-Intell.		−0.07	0.08	
Music		Classics	Av.	+0.63	0.03	+0.85
"		French	"	+0.57	0.03	+0.77
"		English	"	+0.51	0.03	+0.69
"		Mathematics	"	+0.51	0.03	+0.69
"		Pitch Discrimination		+0.40	0.06	+0.63
General Intelligence		Classics				+0.99
"		Pitch Discrimination				0.94
"		French				0.92
"		English				0.90
"		Mathematics				0.86
"		Music				0.70
Amal. School Place		Music and Pitch Discrim.	Av.	+0.72	0.02	
General Intelligence		***General Auditory Faculty***				*1.00*
						(p. e. about 002)

The probable error does not here seem over 0.05 at most.

[1]All School Places below this point refer to the musicians considered alone.

Experimental Series V.

Adults.

A. Original Data.

Reagent	Sex.	Age.	Pitch 1/3 v. d.	Light 1:200	Weight 1:200	Remarks.
m[1]	f	27	3	4	8	
n[2]	f	23	7	7	6	
s[3]	m	39	2	3	15	Psychologist, experimental
v[4]	m	55	7	5	6	Plays violin
m	m	53	6	5	8	
v	m	69	5		10	Maker of musical handbells
n	f	24	10	8	2	
m	f	45	7	8	8	
n	f	21	10	8	6	
m	f	22	10	3	16	
n	f	22	10	12	4	
s	m	78	5	8	30	Has unusually pronounced calcareous degeneration of the arteries
m	f	30	7	24	8	
m	f	30	15	4	12	
v	f	52	27	5	10	
v	m	45	65	7	8	
v	f	40	15	6	15	
m	f	30	12	48	6	
n	f	22	15	8	16	
n	m	50	30	15	10	
s	m	21	10	20	14	Has bad epilepsy
v	f	35	100	6	14	
s	m	40	100	8	12	Extraordinarily slow thinker
v	m	25	30	15	18	The village organist
n	f	40	30	20	28	
v	m	40	80	12	19	
v	m	40	180	11	9	

[1] m indicates (in this column) that the reagent has been specially selected on account of remarkable musical talent; 5 are amateurs and 2 are professionals.
[2] n indicates normal and the reagents may be regarded as fairly typical of the class termed "well educated;" they contain about their average proportion of musical ability.
[3] s indicates specially selected for some characteristic mentioned in the column of remarks.
[4] v indicates well-to-do villagers.

B. Calculated Correlations.

Description.					Amounts.		
First Term		*versus*	Second Term		Raw.	Prob. Err.	Corrected.
Pitch Discrim.			Light Discrim.		+0.32	0.08	+0.39
"	"		Weight	"	" 0.31	0.08	
Light	"		"	"	" 0.11	0.08	
Age	"		Pitch	"	" 0.07	0.08	0.00
"	"		Light	"	" 0.15	0.08	
"	"		"	"	−0.14	0.08	

CORRECTIONS TO "MEASUREMENT OF ASSOCIATION."

Page 84 In first equation dele "$\frac{3a-b}{2a+b}$" and subs. "$\frac{3}{2}\cdot\frac{a-b}{a+b}$"

Note 1 should be

"More accurately, $r = \sin \frac{\pi}{2}\cdot\frac{a-b}{a+b}$

Hence, when the correlation is very complete, etc., etc."

Page 85 Dele "More accurately, $r = \sin \frac{\pi}{2}\cdot\frac{a-b}{a+b}$"

LITERATURE.

The British Journal of Psychology. Edited by James Ward and W. H. R. Rivers, with the collaboration of W. McDougall, C. S. Myers, A. F. Shand, C. S. Sherrington, W. G. Smith, Vol. I, Part I. January, 1904. C. J. Clay and Sons, London. pp. 115.

Besides the editorial this first number contains the following articles: James Ward, On the Definition of Psychology; C. S. Sherrington, On Binocular Flicker and the Correlation of Activity of "Corresponding" Retinal Points; J. Lewis McIntyre, A Sixteenth Century Psychologist, Bernardino Telesio; W. McDougall, The Sensations Excited by a Single Momentary Stimulation of the Eye; W. McDougall, Note on the Principle underlying Fechner's "Paradoxical Experiment" and the Predominance of Contours in the Struggle of the two Visual Fields; Proceedings of the Psychological Society.

This journal will be issued in parts at irregular intervals, and a volume consisting of about four hundred and fifty pages costs fifteen shillings in advance, single numbers, five shillings.

The American Journal of Psychology welcomes most heartily the new British Journal of Psychology and congratulates it upon its almost ideal form both in type and page. Its establishment ought to mark an epoch in the development of British thought as important as that marked by the establishment of Mind by the late Croom Robertson and Mr. Bain many years ago. The difference of standpoint between the first numbers of these two journals is typical of the tendencies of modern thought in this field. In the editorial we are told that there are about half a dozen lectureships already established to promote the study of psychology as a science, that psychology is independent of the control of philosophy, having its own methods, problems and standpoint, that ideas "in the philosophical sense do not fall within its scope: its inquiries are restricted entirely to facts. In pursuit of these it is brought into close relations with biology, physiology, pathology, and again with philology, anthropology, and even literature. Its results, also, have important, practical applications for the educationist, the jurist, the economist, quite apart from their theoretical bearing on the problems of the epistemologist and the moralist." It is to be "devoted exclusively to psychology in all its branches, analytical, genetic, comparative, experimental, pathological, individual, ethnical, etc." It aims to serve as an organ "for all alike who are working in any one of the many branches into which psychology has differentiated." "Among the standards by which communications will be judged, that of length will not be one."

The articles of Sherrington and McDougall are admirable laboratory investigations on optical phenomena, well calculated to show the great advantages of work with instruments to advance self knowledge even of elementary sense activities which introspection could never attain without the aid of these methods. The historical study on Telesio is an interesting picture of a sixteenth century man who regarded human nature a part of nature subject to natural laws and to be developed by purely empirical methods. The article of James Ward is written from a very different standpoint which, to the writer of this note, seems both effete and sterile. He tells us how Aristotle and then how Descartes regarded psychology and of the great change that has lately supervened from the conception of the soul as a *res cogitans*, which

had in a sense further development in the panlogism of Hegel, to the more efferent conceptions illustrated by Kant's "Critique of the Practical rather than the Pure Reason, by Schopenhauer," etc., and how this reaction against intellectualism has lately been extended and confirmed by evolutionary and experimental studies which insist that the will rather than the intellect is our clue in understanding experience, how this makes knowledge no longer an end in itself but always a means. He finally concludes that "in every case physiological and comparative psychology must fall back on the facts and analogies of our own experience." The view that begins with mechanism and ends with mind gives the experient only a presentational kind of physiological psychology of the worst sort, "where physiological and psychological conceptions are forever coquetting with each other, and where, as a result, unseemly hybrids are not infrequent," like Huxley's "Ideagenous Molecules."

Now, all this seems to us trite, barren, obsolete and irrelevant. There is no more patent and commonplace fact in the psychological world than this great transition, and nothing that the student of mind is so ready to admit as that man is indefinitely more anthropomorphic than he knows and must forever judge and know everything in terms of his own psychic activities. But one of the chief claims of experimental, genetic, and comparative psychology is that it sheds new light upon our own activities which the arm-chaired introspectionist who turns his mental eyes inward has grown impotent to add to. The other papers in this first number make contributions of what was unknown before to the modern reader. This adds nothing. In fact the introspectionist of this type has ceased to interest the progressive, modern student of mind, except that his writings are precious documents of a unique type of mind. The mortgage the epistemologist always demands the experimenter to cancel is essentially a spurious one. The limitations he lays down, the definitions in which he is so profuse, the stepmotherly anxiety lest the laboratory man should make some *faux pas* or perturb his circles, suggests that the true "hybrid" is the epistemologist who attempts to legislate for experimentation in which he has no practical experience. The very life of the new psychology depends upon whether it can throw off the leading strings of the old sufficiently to secure its own free movement. It is preposterous, at present, to define psychology save as Bleek long ago undertook to define philology: *es ist was es wird*. It is in a process of rapid development. It has so many lines and departments that if it could be correctly described to-day all the definitions might be outgrown to-morrow. None but an almost parnoiac systematism would attempt to write even a logic or a methodoloy for it. As grammar comes after the golden period of language and literature, so these things must come when the present enormous expansion of psychology in all its departments is approaching the end of a period. The new movement owes all its achievements to the method of treating psychic activities as natural phenomena and as well might a speculative materialist attempt to "hold up" or cast suspicion on the actual laboratory work of physics and chemistry, because no one knows just what an atom, a vortex, or ether really is, as the epistemologist obtrude his scholastic scruples into the domain of psychology as a science. H.

Grundzüge der Psychologie, Band I. Allgemeiner Teil. Die Prinzipien der Psychologie, von HUGO MUENSTERBERG. Leipzig, J. A. Barth. 1900. pp. XII+565. 12M.

This first volume of a treatise upon which Professor Münsterberg is engaged, deals only with the fundamental principles and general problems of psychology. While it is for that reason introductory in scope

and character, yet it is in a measure complete in itself. The forthcoming part of the work will round off the author's system with a discussion of the special problems of individual and social psychology.

Professor Münsterberg's point of view is already familiar to readers of his "Psychology and Life." The rapid progress of the sciences in the nineteenth century, and the wide-spread interest which they excited, turned contemporaneous thought into a naturalistic channel. The scientific method was extended to more and more disciplines; scientific explanations were pressed into ever-widening fields. This tendency attained such impetus that its influence is felt upon the thought of the present day. Its dominant characteristics are lack of criticism and absence of systematization. Sound philosophy has been dethroned and naturalism reigns in her stead. The movement has left psychology in a deplorable condition. There has been a thirst for facts and particular details with but little desire for a systematized body of knowledge. Moreover the psychologist's zeal for the amassing of facts has led him to ignore the epistemological and metaphysical principles involved in his search. His method of procedure has been left to the guidance of instinct; he has been guilty of every crime in the philosophic calendar.

Now the psychologist is clearly within his rights in refraining from constructing a system. But if his solution of the problems is even to approximate finality he must be discreet in his choice of methods and discriminating in his use of concepts. It is essential, then, that we go back to first principles and look well to our foundations before we proceed to build upon them. The psychologist must be sure he is right before he goes ahead; it is Professor Münsterberg's purpose not only to show him that he is wrong but to set him right. Hence the present volume is not concerned with a re-enumeration of the particular facts of psychology. Its object is more fundamental and preparatory; it aims to ensure future progress and to safeguard future results by subjecting the foundations of the science to a critical examination. It is the vanguard of the oncoming army of psychologists; its mission is to map out a safe line of march and to establish a secure base of operation. But besides laying down an epistemological foundation for psychology by a critical examination of the fundamental concepts, assumptions, limits and ideals of the science, it emphasizes the necessity of a systematization of psychological knowledge.

Professor Münsterberg champions the cause of idealism as against the prevailing positivistic tendency. The book is a polemic against the "positivistic view of the world which grows out of psychology itself in more and more threatening form;" its author disclaims any disposition on his own part to "elevate psychology to the rank of a positivistic philosophy." As a metaphysician Professor Münsterberg is an ethical idealist of the Fichtean school; as a psychologist he is an atomist of the most extreme mechanical type. He promises a synthesis of these two positions; not, however, by inconsistent compromises on either side, but a higher synthesis which will do strict justice to idealism while it guarantees the most complete freedom to experimental psychology.

He begins his task by working out a classification of the sciences from the basis of the antithesis between causality and teleology. He recognizes two distinct types—the objectifying and the subjectifying sciences. Sciences of the first type deal with a subject-matter which is regarded as mere meaningless existence, while in those of the second type the datum has meaning or value for the subject. Scientific procedure in the former case consists in defining the character of the meaningless objects and discovering their causal relations. The sub-

jectifying sciences have to do with the subject's taking up definite attitudes toward significant objects; scientific procedure here consists in interpreting and evaluating the objects, never in determining their causal connections. Physics and psychology fall under the objectifying category, while history, ethics and æsthetics are representatives of the subjectifying group.

Within each of these groups appears a second bipartition, based upon the degree of community of the object. Certain objects regarded as unmeaning existences, are the common experience of several individuals, and are for that reason assigned to physics. Other meaningless objects constitute the subject-matter of psychology, in virtue of the fact that they are the peculiar possession of but a single individual. The same distinction is carried through the subjectifying sciences, where the individual acts of will of the position-taking subject are set over against his common or over-individual acts of will. The latter fall within the province of the normative sciences while the former become the material of the historical sciences. The two scientific methods remain distinct throughout. It is the business of the objectifying sciences to *explain* by a process of tracing out causal sequences. The subjectifying sciences make no use of the concept of causality; it is their business to *understand*, by a process of interpretation and evaluation.

It is to be borne in mind, however, that the sciences do not deal with real experience. Primary experience is transformed and made over for scientific purposes—a transformation which differs in kind for each of the various classes of science. For while one science regards its transformation product as a bare non-significant existent, another treats its product as a significant content whose meaning and value are to be unfolded. Moreover it is the employment of this transformation process which differentiates the man of science from the practical man of real life. It is only in the affairs of real life, as opposed to the scientific pursuits, that we have to do with reality. The sciences deal with fictitious objects arbitrarily abstracted from the world of reality for purposes of scientific expediency.

An examination of the psychical object—this meaningless mental process which has been marked off from all other objects as the material with which psychology is to deal—reveals the fact that it is even more unlike other objects than has commonly been supposed. It is non-temporal and non-spatial in character; none but physical objects are in space and time. It is also devoid of quantitative attributes. It is not subject to measurement, nor has it any causal connection with its fellows. In short, it possesses the single attribute of quality.

Psychical objects, then, constitute a series—or a number of series,—each of whose terms is distinguished from every other by qualitative differences only. It has been customary in psychology to assume that variation of sensation runs parallel with variation of physical stimulus, *e. g.*, to correlate pitch, tonal intensity and clang tint with the length, the amplitude and the form, of the sound-wave; and thus to find a physical basis for the classification of the differences of sensation. But the complexity of the relations obtaining between stimulus and sensation, together with our almost total ignorance of the intervening brain process, makes this basis of classification hazardous and undesirable. It is proposed, therefore, to work out a classification based solely upon the material of the psychical series themselves. All qualitative differences are first subdivided into three classes—differences of content-quality, of form-quality and of value-quality. Within each class again are found characteristic differences in accordance with which the members of the class may be seriated in various dimensions.

The list of possible dimensions of the first class includes kind, intensity and independence, *i. e.*, the degree to which the individual sensation resists fusion and loss of identity on entering into combination with others. Variations of form-quality also show well-marked dimensional directions of kind of form (spatial and temporal), intensity of form, and independence of form. The value-qualities constitute a more multiform series of dimensions, to which belong values of vividness, of pleasantness-unpleasantness, of spatial direction, of temporal direction and others.

As a result of the utter poverty of relations manifested by mental processes they cannot be explained or even described, save by an indirect means. The assumption of a strict psychophysical parallelism furnishes a solution of this problem. The psychical process may be described and explained by stating the physical conditions under which it arises and the physical effects which follow upon it. The discussion of the principle which Professor Münsterberg adopts as the touch-stone of psychological explanation—his Action Theory—constitutes what will doubtless prove to be the most valuable portion of his book.

Before he formulates the action theory he prepares the way by a detailed criticism of associationism and apperceptionism, which he proposes to supplant. He recognizes the heroic service rendered by the theory of apperception in the history of psychology—a service which consisted in combating the overestimation of associationism. Yet the theory of apperception must be rejected because no purely sensory theory can do justice to the wealth of mental content, nor can it, from the very nature of the case, account for the phenomenon of inhibition. Moreover, it is unscientific in that it applies the category of teleology to a purely causal series. The association theory is no less inadequate. In the first place it furnishes no physiological substrate for variations of psychical elements other than changes of quality and intensity. The varying degrees of vividness or forcibleness are left unaccounted for. And in the second place it gives no clue as to the mechanism which selects the psychophysical excitation, *i. e.*, it does not explain why this particular sensation and not another has been facilitated and endowed with greater vividness. The fundamental process which it sets out to explain is left to the guidance of accident; only the final effect is described in physiological terms. Its fatal defect, in short, is its failure to give a psychophysics of vividness-values. Yet the theory of association is sound in principle and is acceptable so far as it goes. It must, however, be supplemented by the introduction of an auxiliary factor if it is to become a satisfactory psychological theory. It has already been pointed out that no merely sensory theory can furnish an adequate basis for the explanation of all psychical phenomena. Inhibition, for example, can come about only through the opposition and counteraction of antagonistic factors. Now, there are no two ideas which as psychical processes exclude each other; there are no two sensations whose nature is such that they cannot occur in consciousness together. Psychological explanation must, therefore, have recourse to the motor functioning of the organism. The paired arrangement of the muscular mechanism furnishes just such a system of antagonistic factors as is required. Every flexor is opposed by an extensor; the contraction of the one, means the absence of contraction in the other.

The problem which the action theory attempts to solve is one of the most important, and one of the most elusive in the whole field of psychology. How are the familiar facts of facilitation and inhibition to be explained? What determines the varying degrees of vividness of

sensations? Why, in a given case, is this sensation and not another facilitated or inhibited?

Professor Münsterberg's action theory takes over from the theory of association the following theses: Sensation is the sole content of consciousness; the quality of sensation depends upon the spatial position of the sensory area of the cortex which is stimulated; the intensity of the sensation depends upon the strength of the excitation which is conducted to the cortex. Here he introduces a new factor—the centrifugal excitation which passes from the cortex to the motor apparatus—and sets up a new thesis: the sensation depends for its vividness upon the intensity of the centrifugal or motor excitation. It is assumed, then, that the sensory excitation as such, is not attended by a psychical process but enters consciousness only on being transformed into motor discharge. Sensory excitation without discharge corresponds to the minimal degree of vividness—to total inhibition of sensation. And the more complete the discharge, the more vivid and forcible the sensation. In every case the possibility of motor discharge is the *sine qua non* of the psychical process. The motor discharge, in turn, is itself conditioned by the molecular disposition of the efferent path.

A physiological basis is furnished for the theory in the paired arrangement, and the reciprocal antagonism of the motor centres. Every motor centre has a corresponding, but antagonistic motor centre. When either member of the pair is stimulated to action, the other member is, by that very fact, condemned to inactivity. This opposition of motor functioning is the basis of all facilitation and inhibition, of all selecting and discarding of psychical processes.

The action theory may be stated baldly as follows: Every mental process is constituted from two factors—sensory and motor. Without the co-operation of motor as well as sensory factors, sensation itself is impossible. The vividness of the sensation depends upon the sensory excitation at the cortex finding an unobstructed path of discharge leading down from the cortex to the sub-cortical motor centres. The excitation of any sub-cortical motor centre is attended by an inhibition of the antagonistic motor centre. Hence it follows that sensations are vivid and forcible in inverse ratio to the amount of resistance which the path of discharge of the sensory excitation encounters in the sub-cortical centres to which it leads. When the discharge of the sensory excitation meets with no resistance, the sensation enters consciousness with maximal vividness; when the path is totally blocked complete inhibition results, and the excitation fails to cross the threshold of consciousness.

This formulation of the action theory, however, gives only its schematic outline. The mental economy is much more complex than our envisagement has shown it to be. Each motor centre is correlated not only with a single antagonistic centre, but with many others besides. As a result of this complex network of co-ordinations, the motor impulse from any centre is in more or less intimate reciprocal relation with a host of other motor impulses from other centres. Moreover practice, fatigue, habit and the like, make themselves felt throughout the system, by effecting various readjustments of co-ordinations. Although motor functioning is enormously complicated by these interrelations, on the one hand, and by the acquisition of these readjusted co-ordinations, on the other, yet the principle of action remains the same throughout. The sensation, or the movement which finally arises in any given case is invariably the joint product of the total motor dispositions and the present sensory excitations.

The possibility of the excitation passing out by way of different

paths of discharge, has not been considered as yet. It is evident, however, that a variation of exit is far from being impossible. The minute anatomy of the cell, and the nature of the chemical processes which take place within the cell, are but little known. But it may well be, that the varying degrees of intensity of excitation, the different kinds and amounts of simultaneous action in other cells, the changing state of cellular nourishment and of resistance in subordinate paths, may serve to switch the motor discharge along different routes. There is ground, then, for setting up yet another thesis, namely, that the constancy of the spatial relations of the paths of discharge furnishes the physiological basis for a constancy of the values of sensations; and that a change in the spatial relations, conditioned by any of the factors enumerated above, is attended by a variation in the sensation value. In its most general formulation, then, the action theory states that every element of consciousness is co-ordinated with the cortical transition from excitation to discharge, in such manner that the quality of the sensation depends upon the spatial position of the path of excitation, the intensity of the sensation upon the strength of the excitation, the shading of value of the sensations upon the spatial position of the path of discharge, and the vividness of the sensation upon the strength of the discharge.

The detailed application of this theory to the special problems of psychology, is reserved for the second volume. A concluding chapter of the present volume, however, briefly indicates how it applies to attention, suggestion, hypnosis, apperception and abstraction. In a given complex that sensation which finds the conditions favorable for motor discharge, is grasped by the attention. That for which action is not ready, passes unnoticed or claims the attention only when the intensity of the excitation compels action. The attention can be distracted only by an excitation which leads to antagonistic action. In suggestion and hypnosis the suggested idea inhibits the opposite idea, —*i. e.*, the idea which incites opposite action—through the medium of the motor centres. The motor centres for certain groups of actions are so attuned that the innervation of the antagonistic movement becomes impossible; the antagonistic idea cannot, therefore, come to consciousness even when the appropriate sensory stimulus is applied. In the case of apperception there exists a peculiar molecular disposition of the motor centres as the result of previous practice. The present stimulus is therefore responded to by a richer and more complex reaction than would otherwise arise. This fuller motor reaction arouses a richer complex of sensory processes, and thus constitutes the psychophysical basis for the difference between apperception and perception. Abstraction is characterized by a general motor innervation. The concept is the idea corresponding to a motor reaction which is common to a group of objects.

Professor Münsterberg's psychology is an atomism of the most extreme and mechanical sort. Sensations are, he tells us, the ultimate products of present-day analysis; but it is by no means certain that the psychology of the future will not push the analysis farther, and decompose the sensations into *Urelemente*. These *Urelemente*, it may be conjectured, will be found to be each unique in kind; their reciprocal action and reaction may give rise to the various phenomena manifested by sensations—thus, *e. g.*, similarity and fusion are to be accounted for. In the present state of physical and physiological analysis, however, we have no elemental psychophysical processes with which to correlate the *Urelemente*. Since for that reason they have no noetic relation with the physical world, they are incapable of communication or explanation. All speculation regarding them must therefore remain, for the present at least, a theoretical luxury.

To summarize: Professor Münsterberg has assigned to psychology a definite place in the hierarchy of the sciences; he has marked off and characterized the subject matter with which psychology is to deal and shown how she is to deal with it; he has laid down a principle for the systematization of psychological knowledge; he has shown how the limitations of that knowledge are to be transcended, how a naturalistic psychology is to be recognized as but a one-sided representation of a reality of which an ethical idealism gives a more adequate account.

The point at which criticism can most effectively be directed against the system, is the assumption upon which is based the classification of the sciences. Here it is assumed that causality and teleology are not only antagonistic, but mutually exclusive categories. The science which has recourse to teleological explanation is held to be debarred, in consequence, from the employment of causal explanation and *vice versa*. This argument is also used, later on, as a weapon against Wundt's theory of apperception. From this assumption and the construction subsequently erected upon it, various paradoxical conclusions follow. Science deals not with a world of reality but with artifacts. The several sciences are not a corporate body but a congeries of discrete and independent disciplines. Their only common ground is the common core of primary experience from which they all radiate in divergent paths. Scientific co-operation, in any general sense of the term at least, is unmeaning. Physics and psychology seem to furnish an exception to this rule; here, however, the relation is not one of mutual reciprocity, but of arrogant dominance on the part of physics, and slavish dependence on the part of psychology. Psychology is denied the possibility of ever becoming an independent science; all her explanations are, at bottom, physiological and psychophysical. Moreover, psychology is divorced from the historical sciences; she belongs to the objectifying camp, they to the subjectifying. Since she is forbidden to interpret, or to draw upon history, it would appear that most writers upon social psychology, at least, have lived and labored in vain. Professor Münsterberg will find few psychologists to agree to this narrowing of subject-matter and method. His is, in the strictest sense, a structural psychology; he denies to functional psychology the right to exist.

There are likely to be protests from the historian as well. A dominant characteristic of modern historical science is its insistence upon the importance of tracing out the *causal nexus* which is held to run through sequences of events. Not only is this method to be abandoned, but no subjectifying science can consistently employ the concept of evolution in any causal sense. Rather than accept these conclusions the historian will raise the previous question and inquire into the logical justification of Professor Münsterberg's original assumption. Are causality and teleology essentially incompatible? Even if we limit the meaning of causality to include none but mechanico-quantitative relations, we can scarcely afford to dogmatize upon the question. In any case the questionable assumption that they are mutually exclusive makes an unstable foundation for a psychological system.

The synthesis between his philosophy and his psychology has not been accomplished in a manner that is satisfactory to the psychologist, at least. That it has been accomplished at all is due to the unreal character of the objects with which psychology is made to deal. The reality of the ethical self is secured by removing psychology from the world of reality and leaving her to content herself with fictitious mental processes.

A criticism of the action theory can scarcely be attempted until the

theory and its application have been presented in greater detail. The new hypothesis is in line with the motor tendency which has been forcing its way to the front in the literature of the past decade. Moreover, it permits an easy envisagement of the physiological processes which are held to be the substrate of mental phenomena. It is, however, based upon a purely hypothetical physiology; its ultimate triumph over other hypothesis of recent origin can only result from its ability to give a more adequate account of the facts of the mental life.

This book should be in the hands of every psychologist. The range of topics treated is wide, the argument is closely articulated and the mode of treatment is original in the extreme. Professor Münsterberg brings to bear upon his work a rare genius for keen and exhaustive analysis. His thorough grasp of details is no less remarkable than his power of systematic generalization. The questions which he discusses have in the main an epistemological bearing, and it is entirely disputable whether his conclusions will be accepted by any large number of his colleagues either in philosophy or in psychology. But quite apart from its more positive and direct contribution to psychological theory, the *Grundzüge* does a valuable service in its searching and systematic criticism of the foundations of the science. Even if not a single position advocated by the author be accepted, their very advocacy and refutation will tend to such a clearing up of ideas as is sorely needed in the science.

J. W. BAIRD.
Cornell University.

Why the Mind has a Body, by C. A. STRONG. The Macmillan Co., 1903, pp. vii, 355.

The title of Professor Strong's book may be interpreted as a twofold promise; first, that the reader is to be given final reasons and not merely empirical formulas and, secondly, that the outcome is to be some form of idealistic doctrine. Both parts of the implicit promise are fulfilled; for, in solving the problem of the relation of consciousness to the physical world, the author rests his case on nothing less than the final nature of things and the final nature of things turns out to be mental. The application of this idealistic doctrine to the problem of psychophysical relationships may be anticipated in a few words.

Reality includes individual minds and other mental 'things-in-themselves.' Now it is inherent in the nature of reality that it should symbolize or represent itself, its symbols or representations being the phenomenal world of perception. Since 'brain-events,' together with their physical antecedents and consequents, belong to the symbolic or phenomenal world and 'mental-events' to the real world, it follows that bodily and mental processes can never meet on the same plane; the current terms 'parallelism' and 'interactionism' do not, therefore, properly represent the relation which they aim to express. The relation is rather one of symbol to thing symbolized, of appearance to reality. The metaphysical conception underlying this doctrine of relationship Professor Strong names Psychophysical Idealism.

The general argument of the book runs as follows. Three typical theories of the mutual relations of mind and body are in the field: the theory of automatism, the theory of interaction, and the theory of parallelism. Each theory—or better each group of theories, since each has various shades of meaning—has its positive arguments and against each strong objections, both formal and material, may be urged. The facts of experience are ambiguous; that is to say, they do not compel an acceptance of any one of the three theories to the exclusion of the other two. Interaction is not susceptible of proof because the causal efficacy of consciousness cannot be directly established; automatism is

illogical because it takes account of those facts only which are adapted to the support of a one-sided causal connection—from body to mind; parallelism, finally, which denies all causal connection between cerebral and mental processes, breaks upon certain facts of biological development that suggests an inherent 'survival value' in consciousness. Even were it possible to settle the elusive relation by appeal to empirical facts, the deeper question, 'why mind and body are related at all,' would remain. "Under these circumstances, the time seems to have arrived for the metaphysical enquiry announced at the beginning. . . . We have discussed the relation of mind and matter without knowing exactly what mind and matter are. We must now turn critically upon the conceptions that have answered our purpose thus far, and seek to make them adequate. It may be that an exact knowledge of what mind and matter are will help us to understand their relation." In carrying the question at issue to the higher court of philosophy, the author is careful to explain, first of all, why physical objects must be regarded as, at bottom, 'modifications of consciousness;' why consciousness—not a hypothetical 'soul' or 'subject,' but immediate experience—is a reality; and why the physical world and consciousness, as thus interpreted, give, together, a fragmentary universe which must be filled in by other, 'extra-mental,' realities; in brief, why 'phenomenalism,' as a philosophical creed, is inadequate.

Professor Strong now approaches the crucial point of his argument. To escape the failure of phenomenalism, he posits the existence of 'things-in-themselves'—"realities external to consciousness of which our perceptions are the symbols." After giving his attention to the historical arguments against 'things-in-themselves,' the author brings three 'positive proofs' of their existence; one proof from the necessity of a 'real' medium between mind and mind, another from the necessary conditions of consciousness, and a third from the origin of mind out of antecedent reality. But not alone the *necessity* for things-in-themselves is shown: we are given, also, a hint as to their *nature*." Since consciousness is "our only sample of what reality is like," and since minds must originate in a real thing of their own nature, we may conclude that the extra-mental reality known as things-in-themselves is itself mental.

Having completed the metaphysical deduction of reality and of its relation to the world of sense, the argument reverts to theories of psychophysical relations and considers them in their philosophical implications. In the practical application of his principles, the author has only to show that the thing-in-itself which is symbolizeed by the cerebral event is *identical with* the corresponding consciousness and his theory of psychophysical idealism is complete. Instead of the traditional brain-and-mind puzzle he has a single reality, accompanied by a symbolic expression, the physiological event. I say he 'has only to show'—as if the task were easy; but it really involves one of the subtlest bits of argumentation in the book.

To give anything like an adequate conception of the work before us would require much more than a running comment on the drift of the argument. At every step, special difficulties are met, counter-arguments are disposed of, rival theories are balanced; but still the logic of the book progresses. It is not easy to overestimate the task that the author has performed. For his fundamental conception, he does not claim originality; but he has done what students of the ultimate psychophysical problem are likely to consider of greater worth than a new theory of the universe: he has disentangled the facts of the case, weighed them, and brought them into immediate and logical relation to philosophical conceptions of the world. The result offers a striking

illustration of the fact—on the way, I suspect, to become a truism—that science and philosophy, however diverse their methods and their intentions, have vital interests in common. The book is, in a double sense, timely; a wide interest in the subject exists (witness the large number of monographs and articles in the current literature) and an authoritative and definitive statement of facts and theories was a pressing need.

The reviewer appends a few of the notes and comments that have accumulated in reading the book. (1) The theory of automatism receives, perhaps, both in the empirical and the metaphysical parts, more than its share of attention. It has always been an adventitious growth in psychology. It is, primarily, a makeshift of biologists and does not, in the writer's opinion, deserve to rank with the rival theories of interactionism and parallelism. (2) Professor Strong seems to overestimate the value to psychology of a metaphysical satisfaction of the psychophysical problem. Without for a moment underrating the author's accomplishment, it may be asserted that had an adequate solution been indefinitely postponed, such empirical theories as are now in the field would, nevertheless, be performing in the interim, good psychological service. '*Why* the mind has a body' turns out to be a philosophical problem; but that *some important relation* obtains between consciousness and bodily processes is a hard and well-seasoned matter of fact in science which in no way stands in need of philosophical sanction. If interaction works or parallelism works, the immediate requirements of science are satisfied. A sharp line of distinction must be drawn between what are, in strictness, *psychological* and *psychophysical conceptions* of the relation in question and *philosophical explanations* of the relation. The psychologist, as a psychologist, is never under the necessity of giving a philosophical justification for his working principle—whether it be of concomitance or of causal interaction. I am not sure that he would be wise—so long as his principle worked satisfactorily—to abandon his position were the universe at large to convict him of stubborn insistence on a metaphysical impossibility. I am not sure he might yield for the sake of 'vital common interests!' But the point is that however 'unreal' the world of sense, psychology, together with natural science, *must* descend into that world six days out of the week and *must* take account of it. If brain-events are representations of things-in-themselves they are also—what is much more important to the psychologist—cerebral functions which are bound up with mental processes. In the work-a-day world of science, parallelism helps because it recognizes this fact. It may *simply* recognize it—not even denying interaction—and still be parallelism. Thus it comes about that however strong our allegiance may be to psychophysical idealism, we must—just so long as we go down into a phenomenal world to work among 'physical shadows' and 'symbols'—employ terms adequate to the behavior and to the interrelations of 'phenomenal' things and events. (3) Psychophysical idealism, which peoples the real world with conscious things-in-themselves, is curiously like certain 'representation' theories of mind, read backward. The common property of individual minds and other things-in-themselves seems to be the capacity to symbolize, to create for themselves phenomenal 'doubles.' But is it of the essential nature of consciousness to be symbolic? Or is it only of consciousness at a given 'intellectual' level of development? Although Professor Strong attempts to make his type of idealism the idealism of 'feeling,' I am not sure but that it is, really, the idealism of 'perception,' whose "fundamental maxim is '*esse-percipi*.'" Were we to take "as our sample the consciousness of an earthworm or a polyp"

—as the author allows us to do—it is possible that things-in-themselves would wear a different aspect. (4) The theory of extra-mental realities proves to be superfluous for the immediate satisfaction of parallelistic doctrine; for the *individual mind* is the only real side of brain-events and brain events are the only fragments of the physical world that parallelism is concerned with. All other realities remain as a kind of adhesive medium whose difficult function it is to prevent a pluralism of individual minds. (5) If the reviewer has not missed the author's meaning, the theory of psychophysical idealism parallels reality—in so far as reality is individual mind—with two, not one, phenomenal 'symbols.' For the physical object, since it is a 'modification of consciousness,' must be a symbolic, phenomenal modification of that consciousness; but that same consciousness is already represented symbolically by its brain-event. Another difficulty arises: the physical object represents not only consciousness but also the real thing-in-itself for which it appears. We have, then, one reality (consciousness) with two symbols and one symbol (physical object) with two realities. The obvious way out is solipsism; *i. e.*, the thing-in-itself is identical with the individual consciousness. Even this solution is not highly satisfactory, for it leaves us with the paradox: reality as individual consciousness is paralleled by object of perception, as thing-in-itself by brain-event—whereas it ought to come out just the other way round. Then, too, solipsism brings back the old difficulty of pluralism. (6) In the latter discussion of parallelistic theories, Fechner's name is conspicuous for its absence,—though his historical importance is acknowledged in the preface,—and Wundt's theory of 'actuality' should have had at least a paragraph. This criticism might, indeed, be made more general; for references to the current literature are almost entirely wanting. The reviewer would consider this omission serious where the book is to be placed in the hands of students. The author has recently (Psych. Rev. XI, No. 1, p. 67) supplied a partial list of references.

Cornell University. I. MADISON BENTLEY.

Die reproducierte Vorstellung beim Wiedererkennen und beim Vergleichen. E. A. McC. GAMBLE AND M. W. CALKINS. *Zeitschrift für Psych. u. Physiol. der Sinnesorgane*, XXXII, pp. 177-199; and XXXIII, pp. 161-170.

This paper states the results of an experimental investigation of the theory of Lehmann, that recognition consists in the image, or series of images, associated with the experience which is felt to be familiar. The introduction contrasts the doctrine of Lehmann (1) with the theories by which recognition is, or includes, a complex of affectively toned organic sensations, and (2) with the doctrine that the essential feature of recognition is an unsensational and unaffective content of consciousness—a certain distinctive "feeling of familiarity."

The experiments fall into two groups, each suggested by tests made by Lehmann himself. The first set of experiments furnishes data for a statistical analysis of recognition. The subject was given a series of odors in absolutely uniform bottles, and was required (1) to write down after smelling each odor, the associated images as nearly in their order as possible, (2) to mark with a dash any pause in the train of images, (3) to state in writing whether the smell was familiar or unfamiliar, and (4) to set down its name if known. The average number of odors used was forty-six. The total number of subjects was twenty-four. Of these subjects, twenty-one were undergraduate students and three were teachers of psychology. No subject understood the purpose of the experiment. In stating the results, the

smelling of each odor by each subject is counted as one "case." The total number of cases is 1,106.

The results furnish three arguments against the Lehmann theory. First, as in Lehmann's own results, there was a small percentage of the total number of cases (.9% for the practiced and 4.7% for the unpracticed observers), in which recognition appeared to occur without supplementary associations. It seems unlikely that recognition consists essentially of experiences too fleeting or too obscure to be detected introspectively. Second, in 6.2% of the total number of cases, smells were pronounced unfamiliar despite the fact that associations were recorded which were "correct" in the sense of being clearly explicable by former experiences of the same or of similar smells. For the verification of this most important point, a separate count was made of the cases in which olfactory associations (smell-names, not necessarily smell-images) occurred. The total number of such cases was 700. In 97 of these cases the smells were pronounced unfamiliar. In 62.9% of these 97 cases, the olfactory associations included or consisted of the names of smells which were similar strictly (according to Zwaardemaker's classification) as odors and not merely in affective value. Third, in 23.9% of the 869 cases in which the odors were pronounced familiar, the supplementary associations are expressly indicated as coming later than the feeling of familiarity.

The same set of results furnish data for two incidental conclusions. First, the time-notes of the observers showed that in many cases neither the feeling of familiarity nor the feeling of unfamiliarity as understood by them supervened directly upon the sensing of the stimulus. In the interval consciousness was filled simply with the sensation. Thus, the feeling of unfamiliarity seems to be a positive experience and not merely a negation of familiarity feeling. Second, out of 233 cases in which the odor was correctly named, in 76.4% the name given was the first association in a series, whereas in only 9% was it the last association. These figures bring out the high suggestive value of the name; they do not tend to show that the name caps and completes recognition by closing the association series.

Furthermore, it is worthy of incidental notice, that the records contain a few spontaneous references to the "effort" to recognize or to the "relief" of recognition. The fact that these remarks were unsolicited lends support to the view that organic sensations play an important part in recognition. Moreover, there is one statement in the records which might possibly be interpreted as a reference to a non-sensational and non-affective consciousness of familiarity.

Aside from these references, the outcome of the experiments is purely negative and may be stated thus: The recognition consciousness is not constituted by associated images whatever it may actually consist in and however generally such associations may be present in it.

The second group of experiments consisted in tests of qualitative discrimination for named stimuli as compared with unnamed stimuli of the same character. Both colors and smells were used. The colors, in the form of blue and purple liquids and of (Marbe's) blue and gray papers were alike in hue but were graduated in brightness with nine colors to a series. The odors consisted of groups of seven piney essential oils and seven artificial perfumes. Before the discrimination experiments were made, a set of names (scale-names, such as "Lightest" and "Very light," for the colors, and individual names, such as "Syringa" and "Rosemary," for the smells) were impressed upon the observer for one or the other of the two comparable sets of stimuli. As indicated above, the object of the experiment was to ascertain whether verbal associations attached to the one set of stimuli would

make discrimination more accurate for it than for the other. Each color was compared only with its own next neighbor in the series whereas each odor was compared with every other odor in the same group. In a certain proportion of the comparisons, the same color or odor was repeated. The interval between the stimuli compared was one minute *minus* the seconds of the first exposure-time, namely, ten seconds for the odors, five seconds for the colored papers and two seconds for the colored liquids. The subjects were all under-graduates, three or four in number for each two sets of comparable stimuli. Each observer made at least one hundred comparisons within each set of stimuli.

A comparison of the number of errors for the named and for the unnamed stimuli shows that a scheme of names was of slight assistance to three-fifths of our subjects in qualitative discrimination, but that the advantage was trifling, not a gain of 5% of right cases for the named series. An examination, however, of the direction of errors so appertained shows that at least, in the case of the colors the name-images aided only in discrimination proper, and actually increased the number of failures to identify. When the stimulus was repeated the percentage of wrong cases in the named series exceeded by ten the percentage in the unnamed series. Thus, it would appear that in so far as recognition is equivalent to the consciousness of sameness, associations artificially provided in the form of verbal tags tend rather to inhibit than to facilitate its occurrence. The result, therefore, of the investigation as a whole is to discount the value of supplementary associations both in recognition and in comparison.

ELEANOR A. MCC. GAMBLE.

On the Validity of the Ergograph as a Measurer of Work Capacity. A Contribution to Practice and Learning, by T. L. BOLTON and ELEANORA T. MILLER. Nebraska University Studies, Lincoln, 1904, pp. 79-128.

This article gives the results of an experimental study with the ergograph, with the object of determining the value of ergograph records as an accurate measure of work capacity. A detailed analysis of the various factors that enter in determining the ergograph results furnishes the basis for such determination. Thus directed, the study gives results of psychological interest beyond that of merely determining the value of an apparatus. Some general observations on the factors in muscular training, and 'physiological considerations' are first briefly reviewed. Their object then becomes that of a scientific study of these supposed factors. The authors were the two subjects in the experiment, which extended over three months. A procedure similar to the usual in ergograph work was followed. "The ergograph used was a modified form of the pattern designed by Dr. Hoch in Kraepelin's laboratory." A plate, with description, gives the details of the apparatus. Introspective results supplement and interpret the eight full tables given. Four elements in practice gain are first pointed out and described. *First*, inurement, 'a process of hardening and toughening of the skin where it comes in contact with the apparatus, and of habituating the muscles to the strains which the unusual effort imposes.' The severe strain the authors regard as causing 'small leisons of the tissues through the rubbing and twisting of muscular and tendonal fibres about one another which are followed by local inflammations.' This inurement appears rapidly, and is completed before any of the other effects of practice. It is also the first to disappear when work ceases. *Second*, perfection in the co-ordination of movements. At first there are various accessory and useless movements, muscles in the other fingers of the hand, and various other muscles over the whole body being involved

in the strain of maximum effort. These drop out later, and a condition is finally attained in which 'the actual exhaustion point is reached without visible physical or mental signs of fatigue, and it seems to avail nothing to put effort into it.' *Third*, increase in the ability to make the movements rhythmically. Between the metronome beats each part of the movement, together with other stimuli from the apparatus, must be the stimulus for the next part, separated by a time interval that is practically equal to the full reflex time of such act. The whole must become 'a series of reflex actions joined together in a serial order by habit.' *Fourth*, endurance. This is interpreted as an 'increase in the power of the nerve centre to excite a muscle to perform a certain work a greater number of times than it could before the exercise.' Of the four elements in practice gain enumerated, this one is acquired more slowly. The working of these four factors, and their inter-relations in affecting the work capacity are then further traced out in the results. After three rest periods of six days each the work capacity begins each time at a point above that at which it stood when the rest period began. This they attribute to the last factor, accounting for it by the supposition that 'the nerve centres and muscles were in a state of incipient exhaustion, and that during the rest period they built themselves up to the highest level of metabolic change for which they had been prepared by the exercise.' A very large vicarious practice effect is found, when one hand is given a rest period while work with the other continues, and this in spite of the loss of inurement during the rest period for the unused hand. This vicarious practice they regard as mostly in the direction of co-ordination and rhythm. The records for the right and left hands also show certain differences in the progress of practice gain, indicating that the different elements in practice gain may enter in different relations for different muscles. 'Different muscles in the same person seem to show idiosyncracies in the way they work. What one accomplishes in the way of skill another makes up through endurance.' From all these relations it happens that the hand that shows the greater practice gain at first may not do so later, and the order of the two hands may alternate more than once. Again, lack of inurement at first keeps the record down. As this lack diminishes the practice gain will be great, and later it will be less, due to a change again in the relation of the factors that enter. In a daily series of several contractions to exhaustion with one minute pauses between, the recuperative value of the pauses may be different for the two hands; it changes with the degree of practice attained, as does also the relative recuperative value of the successive minute pauses. Hence, in regard to the value of the ergograph as a means of measuring work capacity, the authors conclude that 'ergograph records change relatively in the course of a long series and thus the first records in a series are invalidated, for maximum performances furnish a more reliable measure of work capacity. That since exercise induces a condition within the muscles themselves which reduces their capacity for work, ergograph records have slight validity until inurement has become thorough and co-ordination complete. That the ergograph is quite unadapted to the obtaining of exact statistics upon a large number of individuals. That records taken upon unpracticed subjects, both before and after operations, whose influences are thought to affect muscular power, are without the slightest claim to trustworthiness.'

F. KUHLMANN.

Clark University.

The Principles of Logic. PROFESSOR H. AUSTIN AIKINS, Western Reserve University. New York, Holt & Co. pp. x+489.

In view of the present wealth of text-books on Logic a new book on

this subject needs something to justify its existence. Professor Aikins's book has this justification. In his treatment of induction he has included several valuable chapters which do not appear in the ordinary text-book and he has endeavored to present deductive logic in a new way. He attempts to treat it from the objective standpoint. It is to be, not a science of thought nor a science of the proper arrangement of words but a science of things as they are dealt with in thought. It "points out the laws of things which all thought should respect," it "deals with the mental implications of the relations of things."

Instead of relations simply of inclusion and exclusion he makes use of five fundamental relations: those of individual identity, subject and attribute, causal or dynamic, non-dynamic and noetic, besides combinations of these. Conversion receives a broad treatment but the most important changes have to do with the syllogism. The traditional rules are thrown overboard and an attempt is made to find the underlying principle of each of the first three figures—the fourth being eliminated as involving no new principles. For the first figure the principle is: What is said to be true of every member of a group (or every object which possesses a given relation) is said about each one of them even though each is not separately thought of when the statement is made. Two cautions are added: 1. "A relation can belong to some members of a group without belonging to all the members, to any given member, or to any one of a given group of members," and 2, "To say that something is true of certain objects does not imply that it is false of others." Similarly of figures two and three, though the matter is more complicated in those cases.

This mode of treatment is certainly very attractive; it seems much less arbitrary; we may agree with Professor Aikins that it is more philosophical, at least in its aim, than is the traditional treatment; but the claim that it is better pedagogically is more than doubtful. The clearness and definiteness of the traditional treatment has a pedagogical value that is lacking here, particularly in the case of the second and third figures. The beginner would have more difficulty in applying the somewhat complicated system of principles and cautions than in using the old rules. For the advanced student Professor Aikins's method is certainly a good one and should deduction be taught in its proper place, after induction, his method might be applied to better advantage.

Particularly noteworthy in the portion of the book devoted to induction are the chapters on statistics, averages and testimony. The last is usually omitted altogether and the first two seldom receive more than a perfunctory discussion. Unfortunately the time usually allotted to logic is too brief to permit the use of the entire book.

A more serious objection to the work as a text-book is the amount of controversial matter it contains. It would have been better if the author had stated his positions dogmatically here and justified them in some work not intended for an elementary text-book.

Many points besides those noted should be discussed, if there were space, but it must be admitted that the author's aim is most praiseworthy and that, whatever the faults of his book, he certainly does make logic a live subject.

ADAM LEROY JONES.
Columbia University.

Die Perioden des menschlichen Organismus in ihrer psychologischen und biologischen Bedeutung, von DR. HARMANN SWOBODA. Franz Deuticke, Leipzig, 1904. pp. 135.

This author scores current psychology, speculative and experimental, which he accuses of absolute fruitlessness. The laboratory gives us only a little more exact expression of what everybody knew before.

It has isolated a topic in which the public has a profound interest and given it a terminology which none but experts can understand. Recent as it is, its pathway is already strewn with dead books. It has desouled psychology. He insists that the only way of salvation is the out-of-door natural history standpoint and, in this work which is devoted to the psychological and biological significance of rhythm in the human organism, he collects many facts from normal and abnormal life that show a monthly periodicity. Reminiscence, he thinks, shows this type and he collects various cases. His work is evidently inspired by fliesses noteworthy study of pathological phenomena which took its point of departure from the menstrual rhythm and its relations to the nasal organ. There are various other periods that Swoboda thinks he has established. Periodicity is a spontaneous tendency to repetition and certain *freisteigende* impressions in waking hours, in twilight reveries, in dreams, in the creativeness of artists and writers, in power to recollect, in the sexual life, in circular insanity, in conversions, conceptions, epileptic tendencies, moods in people subject to them, whom he thinks a class by themselves, all have a monthly rhythm. This is not very apparent in the relational life of association which is dependent upon the environment, but if we only had a method of measuring the spontaneities of mentation, he believes that his thesis would be abundantly demonstrated. All that can be said of it now is that it is an interesting and suggestive but by no means demonstrated doctrine which his book represents.

Proceedings of the Third Meeting of the American Philosophical Association, Princeton Univ., Dec. 29, 30, and 31, 1903, with the address of the President, The Eternal and the Practical, by PROFESSOR JOSIAH ROYCE. New Era Printing Co., Lancaster, Pa., 1904. pp. 142.

This pamphlet gives very brief extracts of many papers which must have made a very memorable meeting, and prints the address of President Royce on The Eternal and the Practical in full. After reading and rereading the abstracts it is very difficulty to form any very clear idea of what many of them attempted to say. For instance, the paper of Spaulding on The Establishment of Association in Hermit Crabs is absolutely unintelligible although his topic is plain. The few lines on Sheldon's paper on Intensity convey no idea that the writer of this note is able to grasp. McAllister's experiments, Tuft's paper on Moral Sense in British Thought, and to a somewhat less extent, the contributions of Sewall, Campbell, Montgomery, Hammond and Creighton, no doubt in themselves luminous and valuable papers, cannot possibly have any lucidity to those who are compelled to depend upon these abstracts for their knowledge.

Einführung in die Philosophie der Reinen Erfahrung, von JOSEPH PETZOLDT. Vol. II. B. G. Teubner, Leipzig, 1904. pp. 341.

The most essential feature of this book is the attempt to carry through the thought that man is not a durable type but an organism in a very active stage of development. But the permanent condition of men, the author holds, can be developed in its main features and on its formal side, and thus only we get the basis of ethics, æsthetics, etc. Regularity consists in the sequence of development and the tendencies to stability are psychic. The question of a goal of this development and of its ethical, æsthetical and logical characteristics constitutes the most interesting part of this book. It seems to the writer of this note to rest on two contradictory assumptions. On the one hand it makes concessions to evolution and gives it a large sphere, but on the

other hand it assumes that at the present stage of things we can predict finality, and it is on this that all his sequences are based.

A Journey to Lhasa and Central Tibet, by SARAT CHANDRA DAS, C. I. E. E. P. Dutton & Co., New York, 1902. pp. 285.

This learned and Christianized Hindu, Chandra Das, born in 1849, became an engineer. One of his fellow students was a lama from Tibet. In 1879, and again in 1884, Das visited Tibet, spending some time at Lhasa and meeting the grand lama. He spoke their language and wore the dress of the country and accomplished an enormous amount of literary work in the way of translations and rendered great service to geography. For political reasons the story of his travels is only just published. He underwent enormous hardships but was privileged to see very much that no English writer has ever witnessed. He gives us interesting perspective drawings, and also a few photographs of the lama, and some of the great Buddhist temples in that country.

Ethnic Factors in South America, by TALCOTT WILLIAMS. The Annals of the American Academy of Political and Social Science, July, 1903. pp. 25-31.

These leaflets are noteworthy for the general statistics which they contain. In South America, we are told, the population is to-day from half to three-quarters Indian, and the white population not over one-fifth. This latter small Spanish speaking people, with odds of five or six to one, is endeavoring, in a region still containing a free and aboriginal population, or its descendants mixed with negro slaves and half-breeds, to maintain and advance the civilization of the Latin races of South Europe. In South as in North America ethnic differences are not sufficiently borne in mind. South America with its total population of forty million people, of which hardly eight million are pure whites, seems destined to maintain this disproportion.

A Practical Treatise on Nervous Diseases, by F. SAVARY PEARCE. D. Appleton & Co., New York, 1904. pp. 401.

This text-book is intended for students and general practitioners. Doubtful points in neurology are curtailed and the practical aspects held chiefly in view. The first forty-seven pages are given to general anatomy and physiology of the nervous system. Then follow methods of examination, prevention of disease, symptomatic disorders, diseases of the cranial, peripheral, spinal nerves, of the brain membranes, local brain diseases, those of the cord, functional, vasomotor, trophic, toxæmic, paretic, troubles, with an appendix on the disorders of sleep. The book is illustrated by ninety-one diagrams and illustrations many of which are pictures of special cases from the author's practice.

Malay Magic, by WALTER WILLIAM SKEAT. Macmillan & Co., Ltd., New York, 1900. pp. 685.

The contents of this book is divided conveniently into ideas concerning nature, man, his origin, soul, place in the universe, the relations with the supernatural world, the Malay pantheon, magic rites connected with air, earth, water and fire, and as affecting the life of man, including birth, adolescence, betrothal, marriage, funerals, medicine, dances, games, theatre, war, weapons, divination and the black art. A number of interesting illustrations are scattered through the book.

Le monde Polynésien, par HENRI MAGER. Schleicher Frères, Paris, 1902. pp. 250.

The origin of the Polynesian Islands is first treated and then the

supposed origin of the people. Then in natural order comes the discoveries, annexations, colonization. Comparatively little is said about the people themselves.

Kulturprobleme der Gegenwart. Bd. IV. Rasse und Milieu, von HEINRICH DRIESMANS. Johannes Räde, Berlin W. 15. 1902. pp. 235.

This work is the fourth volume of a series edited by Leo Burg and entitled Culture Problems of the Present. He first discusses the primitive man and his environment, trying to develop the relations between them. He then describes the origin of caste, migrations, the historical races in Europe, evaluates the Mongol element, discusses the effect of mixture of blood and cultures and of natural selection. Perhaps the most interesting parts are those which treat of France, Spain, Russia and Germany.

Aboriginal American Basketry: Studies in a Textile Art without Machinery, by OTIS TUFTON MASON. Report of the United States National Museum for 1902. pp. 171-548. Government Printing Office, Washington, D. C., 1904.

No one can even look at the 248 full page cuts, many of them colored, which this book contains, without being struck with amazement at the variety and subtlety of this art among our Indians. The whole subject could have fallen to no more competent hands than those of Professor Mason, who has for years studied this subject. His own text is between three and four hundred pages, and altogether this volume will be indispensable for everybody interested in the subject.

Archiv für Rassen- und Gesellschafts-Biologie einschliesslich Rassen-Gesellschafts-Hygiene. Herausgegeben von Dr. med. ALFRED PLOETZ. 1. Jahrgang. 1. Heft. Januar, 1904. Berlin, 1904. pp. 158.

This extremely valuable new Archiv contains eight interesting original articles and many reviews all of which are carefully made and which promise good things in store. Six heften are promised per year at twenty marks. The names of the co-operating editors fill two pages and are several score in number, the only Americans being Jessen of Harvard and Hass of Bryn Mawr. Among these we observe none from either France, England or Italy.

NOTE.

Through the inadvertent omission of a foot-note to my article "Attention Waves and Fatigue" in the Commemorative number (July-October, 1903), I am made to say too positively that Professor Külpe is of the evening type. Professor Külpe's own statement concerning his working habits is: "I have never made exact measurements as to my type, but my experience would indicate that I am neither a morning or an evening worker. Earlier (in my student and early docent days) I was accustomed to prefer the mornings for work in summer and the evenings in winter, and can still work either period at will. I work more effectively physically in the evening."

W. B. PILLSBURY.